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System Requirements Report for Abyssal Plains Waste Isolation Project

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The Department of Defense's Naval Research Laboratory (NRL) has been tasked by the Strategic Environmental Research and Development Program (SERDP) to study environmental viability of the storage of dredged materials, sewage sludge, and municipal incinerator fly ash in the abyssal plains of the ocean floor. Abyssal Plains Waste Isolation (APWI) is the term given by this project to the storage of waste in the abyssal plains. Oceaneering Technologies (OTECH) has been tasked by the NRL to assess waste handling technologies regarding engineering feasibility and reliability.

The first step in assessing waste handling technologies as to engineering feasibility and reliability is to identify top level or system level requirements that will have to be met by any APWI technology considered.

Sources of APWI system level requirements are environmental regulations, physical and chemical characteristics of the waste streams (dredged materials, sewage sludge, and municipal incinerator fly ash), weather/site conditions, and standard references for ocean going vessels. A literature search of each of these sources was performed. The information extracted from these various sources was placed into the categories of handling, transportation, and emplacement. System level requirements were then derived from the information contained in the sources mentioned above.

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ABSTRACT

The Department of Defense's Naval Research Laboratory (NRL) has been tasked by the Strategic Environmental Research and Development Program (SERDP) to study environmental viability of the storage of dredged materials, sewage sludge, and municipal incinerator fly ash in the abyssal plains of the ocean floor. Abyssal Plains Waste Isolation (APWI) is the term given by this project to the storage of waste in the abyssal plains. Oceaneering Technologies (OTECH) has been tasked by the NRL to assess waste handling technologies regarding engineering feasibility and reliability.

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PREFACE

This report presents the system level requirements for candidate waste handling technologies regarding Abyssal Plains Waste Isolation (APWI) of dredged materials, sewage sludge, and municipal incinerator fly ash.

In the development of these system level requirements, Oceaneering examined existing environmental regulations, physical and chemical properties of the waste streams, weather and site conditions, and existing regulatory constraints on vessels. These sources were chosen because they cover all major areas that may place design constraints on whichever technology is chosen and give broad based system level requirements to use in the evaluation of candidate technologies. The information presented in this systems requirements report used as criteria for the evaluation of abyssal plain isolation technologies.

OTECH's information on system level requirements, and evaluation of APWI candidate technologies, including a cost estimate, will be used by the Naval Research Laboratory for its study of the advantages, disadvantages, and economic and environmental viability of storing these waste streams on the abyssal sea floor. The Naval Research Laboratory is simultaneously collecting information on environmental characteristics of abyssal plains, selection of emplacement sites, establishing baseline (physical, chemical biological and geological) characteristics of a suitable area, preparing a monitoring program, and conducting an economic analysis of the deep ocean isolation concepts.

This research was funded under contract number N00014-94-C-6009. Dr. Philip Valent (NRL) is the Principal Investigator and Mr. Martin Fagot is the COTR at NRL for this project.

1.0 SUMMARY

> ***Oceaneering Technology's (OTECH's) role in the study of Abyssal Plain Waste Isolation is to assess candidate waste handling technologies regarding engineering feasibility and reliability.***

The Naval Research Laboratory (NRL) has been tasked by the Strategic Environmental Research and Development Program (SERDP) to study the environmental viability of the storage of dredged materials, sewage sludge, and municipal incinerator fly ash in the abyssal plains of the ocean floor. Oceaneering Technology's (OTECH's) role in this study is to assess candidate waste handling technologies regarding engineering feasibility and reliability.

In the first step of assessing waste handling technologies OTECH identified top level or system level requirements that will have to be met by any candidate technology considered. System level requirements were derived from:

- Environmental regulations
- Waste stream physical and chemical properties
- Environmental conditions encountered from port to site
- Site characteristics
- General regulatory design constraints for vessels

These sources were chosen because they cover all major areas that may place design constraints on any systems solution and/or applicable technologies.

All applicable environmental regulations were converted to a logical flow diagram to illustrate the relationship between regulations and to create a road map of all relevant decision steps applicable to both hazardous and nonhazardous waste. This flow diagram facilitated the identification of essential steps necessary for incorporation into a viable Abyssal Plains Waste Isolation Methodology. This flow diagram was utilized as the foundation for all derived environmental regulatory system level requirements regarding handling, transportation, and oceanic emplacement. These system level requirements must be met either by designing to these standards or assuming that certain laws will be modified. System level requirements derived from environmental regulations are significantly larger in number than all other categories of system level requirements combined.

Oceaneering Technologies independently researched database sources of waste stream properties and correlated our findings and waste stream parameter values with those found by NRL. These results from the two independent investigations will be combined to establish a best estimate for waste stream values. Physical and chemical properties of the waste streams led to general system level requirements with respect to handling, transport and emplacement of these wastes in their normal states.

Oceaneering Technologies utilized the CD ROM version of the "Atlas of the World" to research seastate and wind magnitudes at the candidate Abyssal Plain Waste Isolation sites to assess the potential operational availability versus the system design capabilities. In addition, based on a previous study utilizing a large in-house data base developed for a U.S. Navy contract, OTECH established worst case current versus depth values. Correlation to Abyssal Plains Waste Isolation proposed sites indicates satisfactory design margins of safety. Weather requirements and environmental conditions expected at five potential emplacement sites led to system level requirements to maximize the average number of operating days and survivability if unexpected conditions arise. Current velocities expected at site led to system level requirements with respect to accuracy of emplacement. Temperature, abyssal depth pressure and distance from port to site also led to design requirements.

Existing standard regulations for oceangoing vessels led to straight forward regulatory design constraints regarding different vessel types.

OTECH believes that with the research done to date, all significant system level requirements have been identified. These system level requirements will be applied to candidate waste handling technologies to assess their viability and to select the optimal waste handling approach.

2.0 INTRODUCTION

Oceaneering Technologies (OTECH) has employed a systems engineering approach to identify system level requirements for candidate waste handling technologies.

The Strategic Environmental Research and Development Program (SERDP) tasked the Naval Research Laboratory (NRL) to study advantages, disadvantages and environmental viability of storing waste in the abyssal plains of the ocean floor also referred to as Abyssal Plains Waste Isolation (APWI). The wastes to be studied in this investigation are dredged materials, sewage sludge and municipal incinerator fly ash. The Naval Research Laboratory (NRL) was selected by SERDP to conduct these studies of APWI because of their capabilities to conduct a broadly based program of scientific research and advanced technological development directed toward new and improved materials, equipment techniques, systems, and related operational procedures for the Navy. NRL has six objectives of assessing the storage of waste in the abyssal plains.

1. Identify environmental characteristics of abyssal plains which affect suitability for waste isolation;
2. Select abyssal plain areas possessing these characteristics;
3. Assess candidate waste handling technologies as to engineering feasibility and reliability;
4. Develop a survey plan to obtain a baseline of the physical, chemical, biological, and geological characteristics of a suitable area;
5. Prepare a monitoring program; and
6. Conduct an economic analysis of the deep ocean isolation concepts.

Oceaneering Technologies (OTECH) has been tasked by NRL to assess candidate waste handling technologies as to engineering feasibility and reliability, which is objective number three above. OTECH has further broken down the task into three tasks.

1. System Requirements
2. Technical Analysis
3. Cost Estimate

This report deals only with task number one, system requirements. The purpose of the system requirements effort is to find and document applicable assumptions and requirements used to evaluate potential concepts. Since system level requirements must be met by all potential concepts, these requirements will be used to drive the detailed concept design.

System level requirements with regard to APWI are constraints placed upon a system by environmental regulations, physical/chemical properties of waste handling, volumes of waste, environmental conditions encountered from port to site, site characteristics, and general regulatory design constraints for vessels.

Literature searches were the primary means of identifying system level requirements. Literature searches for this project were simplified by an in-house CD ROM system used for environmental regulations and weather/site conditions. By using key word and title searches, a large amount of information was managed in a limited time. Physical and chemical properties of waste streams were researched at the University of Maryland using their automated card catalog system. This also allowed key word and title searches. In-house copies of general design constraints of vessels helped make convenient the research on this topic.

After literature searches were completed and appropriate documents were reviewed, information pertinent to APWI systems were extracted from these documents. Environmental specialists and system engineers translated regulatory language into quantitative engineering requirements. These derived requirements were broken down into preparation, transportation, and emplacement categories and are found in the RESULTS AND DISCUSSION section of this report. A summary of this systems engineering technical approach is shown in Figure 1. The shaded area includes information presented in this report and shows how these systems level requirements will be used in the next part of the study.

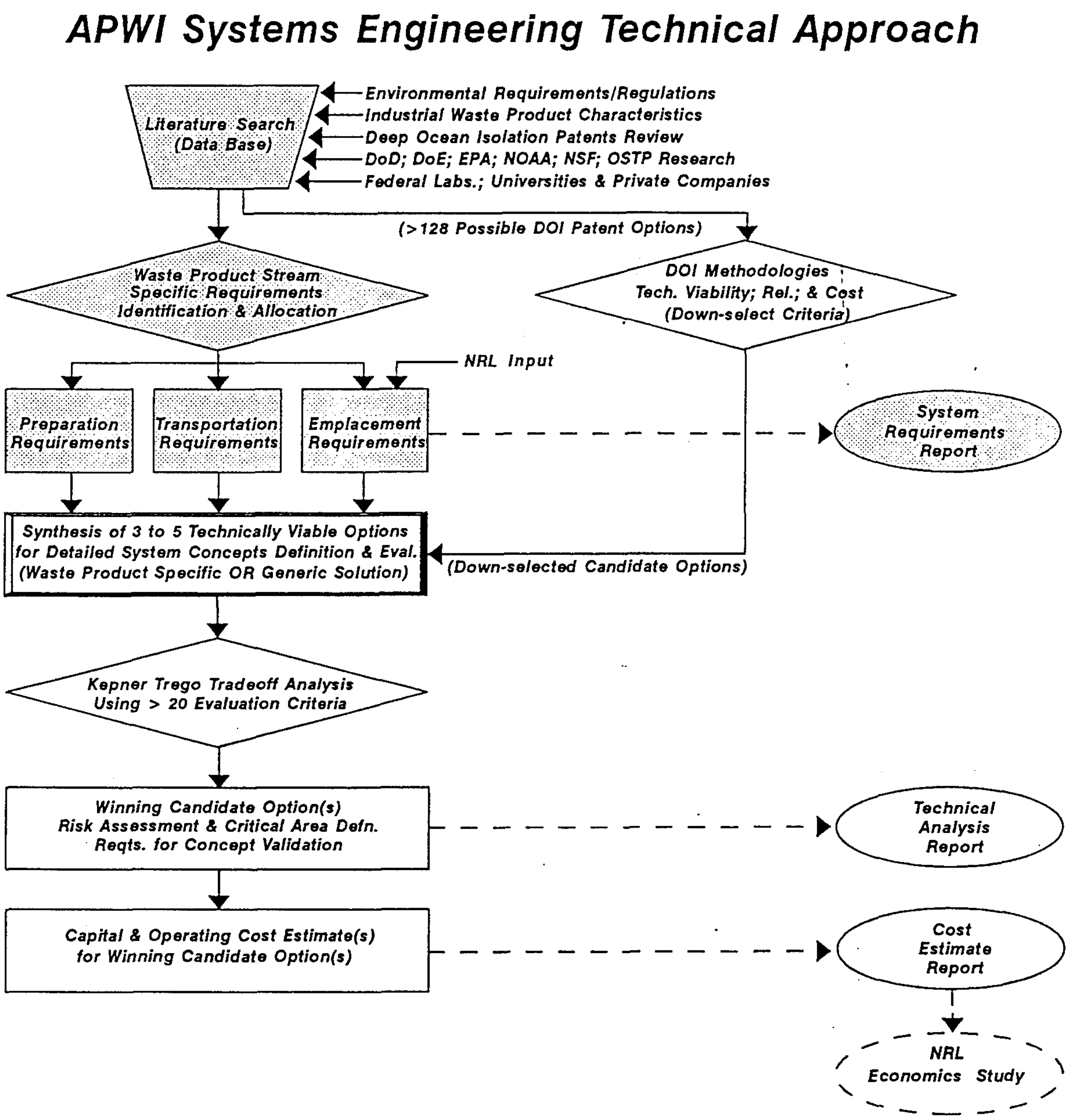

Figure 1
APWI Systems Engineering Approach

3.0 METHODS, ASSUMPTIONS, AND PROCEDURES

Based upon in depth reviews of environmental regulatory requirements, physical and chemical properties of waste streams, weather requirements from port to site, site conditions, and existing vessel regulations, information relevant to Abyssal Plain Waste Isolation was extracted and organized to ease the selection of System Level Requirements.

3.1 ENVIRONMENTAL REQUIREMENTS:

Environmental requirements were researched by performing key word and title searches on CD ROM, collecting and reviewing copies of documents and obtaining cross references. The following cumulative list of source material for researching environmental regulations was obtained:

- 40 CFR Protection of the Environment
- 49 CFR Transportation
- 46 CFR Shipping
- 29 CFR Labor
- 33 CFR Navigation and Navigable Waters
- Marine Protection, Research and Sanctuaries Act (MPRSA)
- Resource Conservation and Recovery Act (RCRA)
- Clean Water Act
- 58 FR 9248 Standards for the Use and Disposal of Sewage Sludge
- MIL-HDBK-1005/8 Domestic Wastewater Control
- Technical Notes from US Army Corps of Engineers Environmental Effects of Dredging

For the purpose of research on this project it is assumed that the 1988 Ocean Dumping Ban Act Amendment of MPRSA will be amended to accommodate deep ocean isolation of waste streams.

Regulatory information pertaining to handling, transportation, and oceanic emplacement were extracted from these documents. The extractions from different regulations were grouped into categories of handling, transport, and emplacement and placed in procedural order. This began with 40CFR and followed the flow of logic tracing cross references until the regulations told the entire story and gaps between information closed. A simplified flow diagram was created to show the general flow of these regulations. See Figure 2. Each block of the simplified diagram was broken down in much greater detail and is shown in a fold-out D size drawing (drawing # DM-103175) presented in Appendix B.

The detailed flowchart is meant to be used as a tool from which system level requirements can be derived. Because regulations are periodically updated, amended, created, or clarified, this document is evolutionary in nature and was created with forethought that it would undergo revision. Each block of information is a separate ASCII text file, that was incorporated in an AutoCad Version 12 Drawing. This allows for quick modifications of the format/layout or editing/insertion of text. The flowchart presents the complicated subtle intermeshing of different environmental regulations written by

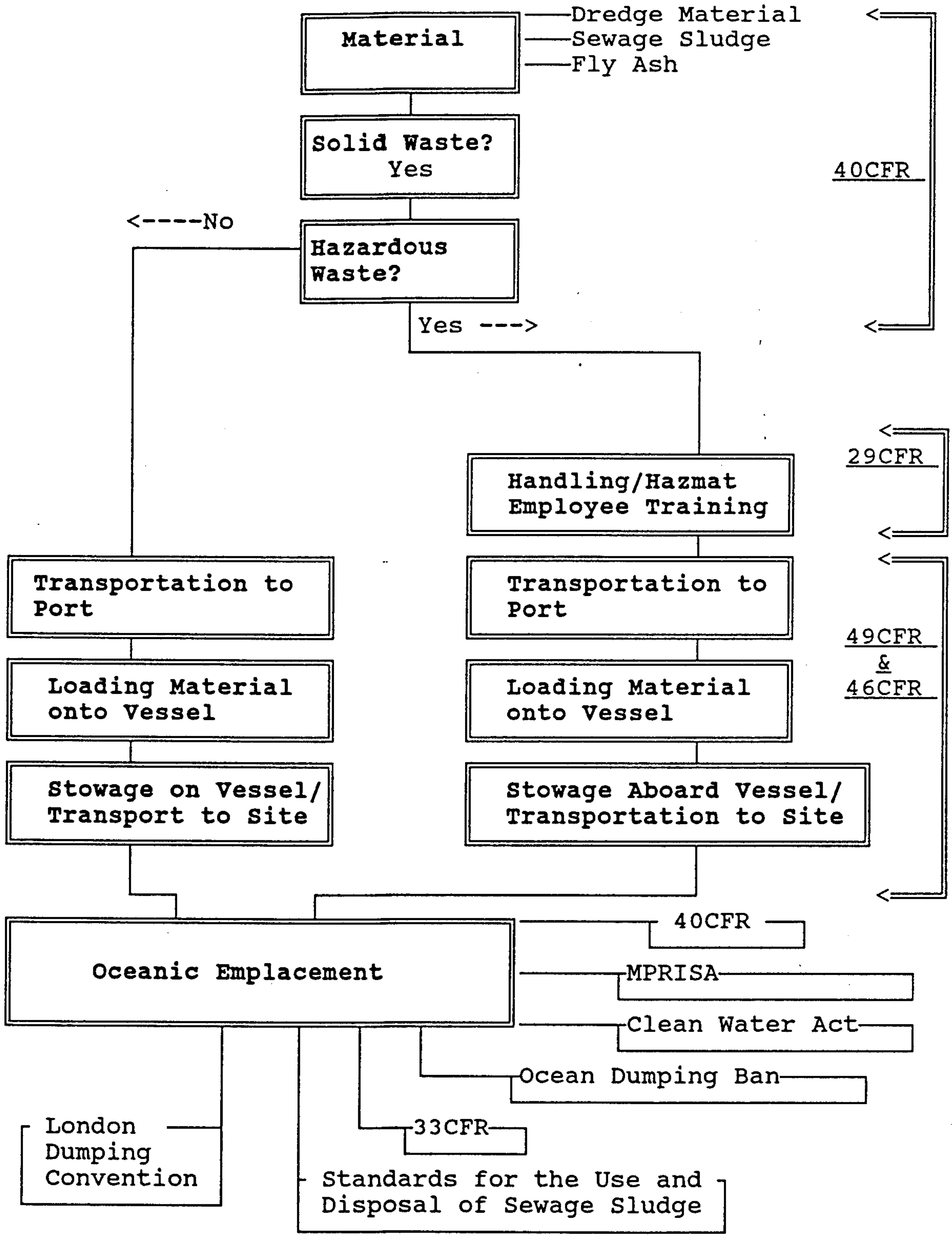

Figure 2
Condensed Environmental Regulatory Flow Diagram

different agencies in different decades pertaining to this subject. This drawing allows one to see, at a glance, how different regulations tie together and assembles information buried in different regulations in procedural order.

3.2 WASTE STREAM CHARACTERISTICS:

We began our research of properties with definitions of the three waste streams the system will have to handle.

Dredged Material - As defined in 40CFR 227.13, "Bottom sediments or materials that have been dredged or excavated from the navigable waters of the United States. Dredged material consists primarily of natural sediments or materials which may be contaminated by municipal or industrial wastes or by runoff from terrestrial sources such as agricultural lands."

Sewage Sludge - As defined in 40CFR 257.2, "Sewage sludge means solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works. Sewage sludge includes, but is not limited to, domestic septage, scum or solids removed in primary, secondary, or advanced wastewater treatment processes; and a material derived from sewage sludge. Sewage sludge does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screenings generated during preliminary treatment of domestic sewage in a treatment works."

Municipal Incinerator Fly Ash - Defined in 40CFR 240.101, Fly ash (suspended particles, charred paper, dust, soot, and other partially oxidized matter carried in the products of combustion) remaining after the incineration of municipal solid waste (normal residential and commercial solid waste generated within a community).

Using these three waste streams as key words in a CD ROM search, and a search in the University of Maryland's computerized card catalog, the following list of source material was gathered:

- CRC Handbook of Environmental Control volumes II and III (Bond, 1973)
- NATO ASI Series - Sludge Characteristics and Behavior (Carberry, 1983)
- Commission of European Communities - Methods of Characterization of Sewage Sludge (Casey, 1983)
- 58FR 9248 Standards for the Use and Disposal of Sewage Sludge
- Military Handbook 1005/8 Domestic Wastewater Control
- Standard Handbook for Civil Engineers (Merritt, 1983)
- Incineration and Combustion Processes. Applications in Environmental Engineering (Niessen, 1978)
- Water Resources and Environmental Engineering (Peavy, 1985)

Information regarding the physical properties, chemical properties, annual volumes generated, and any other information relevant to handling transporting and oceanic emplacement of these three waste streams was extracted from these documents. The most important physical and chemical properties of the waste streams regarding engineering system level requirements are:

- Specific gravity
- Solid content
- Particle size
- Organic constituents

- General chemical composition
- Gas production

Specific gravity shows the ratio of the density of the waste stream to the density of pure water at 20 degrees Celsius. This is an important mechanical property for the design of containment, handling, and transport. The solid content in the waste streams have a large impact on the handling of the waste. Solid content will drive the design of the containment, transfer including the pumping system, and method of emplacement. Solid content also impacts the economics; the lower the solid content of a waste stream, the more water is being transported. In other words, fewer trips to the site will be required to transfer the same amount of waste stream if the solids content is higher. Particle size has an effect on the amount of plume generated at the time of emplacement and the amount of time it takes for that plume to settle out. The amount of organic material does not impact design requirements, but is very important because it directly affects the oxygen content at the abyssal emplacement site. If the percentage of carbon or organic material is very high, then there is a good chance the emplacement site will become anoxic. A knowledge of the general chemical composition of the waste streams is required to flag possible trouble regarding percent organic composition or a possible pollutant in the waste stream. In sewage sludge the amount of gas produced by living organisms is an important issue because of the possibility of ignition or explosion. The characteristics expanded upon above have the most impact or place the most limitations on a system. Other properties researched were volatile material content, insolubility in water, loss on ignition, energy needed to burn one pound, and pH. Variabilities in the values of these physical and chemical properties are expected. These waste streams are source specific and properties can vary greatly from site to site; and at one site values can vary in time. The amount and type of pretreatment undergone by these waste streams can also vary.

3.3 SITE INFORMATION AND WEATHER CONDITIONS:

Weather conditions, currents, and bottom topography were researched for the list of five candidate sites provided by NRL. Research of these site conditions was performed on a CD ROM version of the US Navy's Marine Climatic Atlas of the World. From this atlas, information pertaining specifically to environmental conditions from port to site and site conditions were extracted. Weather conditions were translated into sea state which combines wind and current conditions; seastates are widely used as a reference. These seastates were researched to quantify the upper limit for routine operations and also to determine the greatest seastate the system would have to survive if caught unexpectedly by a "100 year" storm. Temperature ranges the system would have to encounter, abyssal depth pressures, and distances from port to site were also researched. Data on current velocities from the sites was extracted and compared with known values of worst case currents expected.

3.4 EXISTING STANDARD VESSEL REGULATIONS:

The following in house copies of standard regulations for ocean going vessels were gathered:

- American Bureau of Shipping
- 33 CFR Navigation and Navigable Waters
- 40 CFR Protection of the Environment
- 46 CFR Shipping
- 49 CFR Transportation

- Safety of Life at Sea (SOLAS)
- American Petroleum Institute (API RP2A)
- Interface Standard for Shipboard Equipment (DOD STD-1399).

Requirements pertinent to this project were extracted from these documents. These identified design requirements were selected as typical system level requirements for any ocean going system.

4.0 RESULTS AND DISCUSSION

> *OTECH has identified a set of sixty-nine environmental regulatory requirements for hazardous and nonhazardous material for the Abyssal Plain Waste Isolation of waste streams. In addition, eleven top level system performance and operational requirements have been established as a result of supporting engineering analyses.*

4.1 ENVIRONMENTAL REGULATIONS:

Table 1 lists the environmental regulations and gives section numbers that contain applicable information pertinent to handling, transportation, and oceanic emplacement. Table 1 also gives section numbers that contain specific information on dredged sediments, sewage sludge, and municipal incinerator fly ash. From these sections listed in Table 1, the extracted information was placed in procedural order of handling, transportation, and emplacement. The flowchart in Appendix B (drawing # DM-103175) in this report shows this procedural relationship. This flowchart shows a distinction between hazardous and nonhazardous waste regarding handling and highway/vessel transportation, but no distinction in the regulations between hazardous and nonhazardous waste with regard to methods of oceanic emplacement. In other words, in applying for an ocean disposal permit, hazardous and nonhazardous waste will be judged by the same criteria. The regulatory flowchart was used as a tool to derive system level requirements. These sixty-nine derived system level environmental regulatory requirements pertaining to handling, transportation, and oceanic emplacement are listed in Appendix A.

Derived system level requirements regarding hazardous materials include:

- Preparation and packaging
- Personnel training and safety
- Transportation
- Loading and stowage

If the material is not hazardous, derived system level requirements are geared towards spill/leak prevention and broken down by waste stream.

Derived system level requirements for oceanic emplacement that must be met by both hazardous and nonhazardous waste include

- Permitting procedures
- Evaluation criteria for permits
- Site selection
- Site management, monitoring, recordkeeping, and reports

Environmental Regulations

	Hazardous Waste Handling	Sampling Methods/ Hazardous Waste Classification	Hazardous Material Table/Lists	Dredged Material	Sewage Sludge	Fly Ash	Proper Shipping Names, Packaging, Restrictions	Transportation (Trans to port and aboard vessel)	Oceanic Emplacement (site management, permitting)	* Legal/ Enforcement
40 CFR Protection of Environment		260, 261 (app)	261 (subpart D)	225, 230 232, 233	257, 261-268, 501 subpart O	266	261 subpart D	261 subpart D	220-225, 228,270	30.1100
49 CFR Transportation			172.101, 172.102				172, 173, 176, 177	100-177		
London Dumping Convention									■	
Resource Conservation and Recovery Act (RCRA)						6921 6924	6923		6921, 6924, 6925, 6928	6925, 6928, 6971
Marine Protection Research & Sanctuaries Act (MPRSA)					Ch 27 1414b				Ch 27	Ch 27 1414, 1416-1420
Superfund Amendments and Reauthorization Act (SARA)										9607-9609
Clean Water Act				1293, 1344	1345, 1362		•		1342-1345	1319, 1365, 1367
58FR 9248 Standards for the use or Disposal of Sewage Sludge					■					
33 CFR Navigation & Navagable Waters				323					323	
46 CFR Shipping								147-151		
29 CFR Labor	1910.120									
Clean Air Act						7473			7414	7413, 7420
MIL-HDBK-1005/8					47, 48, 62, 154-181			177		

■ Entire Regulation
* Not included in flowchart because not applicable to system level requirements.

Table 1
Environmental Regulations

4.2 WASTE STREAM PROPERTIES:

Compiled results from the research on the physical and chemical characteristics of the three waste streams are listed in Table 2. Apparent in the table, candidate waste systems must be able to handle, transport, and emplace wastes exhibiting a wide range of properties. Some of the wide ranges that will have to be addressed when designing a system are:

- Specific gravity
- Solid content
- Percent volatile matter in solids
- Particle sizes.

Another design constraint that will have to be considered in system design is methane gas production by microorganisms in sewage sludge.

Annual quantities generated of the three waste streams are listed in Table 3. The total number of waste generated annually is listed in the middle column. The right column lists volumes of waste estimated for disposal by APWI. Annually 400 million metric tons of material is dredged, but only 5% or 20 million metric tons is contaminated (EPA, 1993). APWI will only handle the contaminated sediments; "clean" sediments have other beneficial uses such as beach nourishment. By converting the dry weight of sewage sludge to wet metric tons assuming an average of 20% solid content (Table 2), an annual volume of 26.5 million wet metric tons is calculated. The volume of sewage sludge applicable to APWI will be the total annual volume which is 26.5 million wet metric tons. In a recent Supreme Court decision (City of Chicago et al vs. Environmental Defense Fund, May 2, 1994), all municipal incinerator fly ash will be susceptible to testing for hazardous materials. Since all municipal incinerator fly ash is potentially hazardous, the total annual volume (1.5 million metric tons) is applicable to disposal by APWI.

Since sewage sludge is only slightly heavier than seawater, it is recommended that it be mixed with fly ash to obtain a nominal specific gravity of 1.25, similar to dredged material. Sewage sludge at 20% solids has a slurry specific gravity of 1.04; fly ash at 85% solids has a slurry specific gravity of 2.04. To obtain a nominal slurry specific gravity of 1.25, four parts sewage sludge will be added with one part fly ash:

$$(4 \times 1.04 + 1 \times 2.04)/5 = 1.24$$

Although the total annual quantity of sewage sludge is far greater than four times the amount of fly ash, the coastal states have the heaviest concentration of incinerators making this ratio obtainable in those areas. For the Port of New York vicinity, if a fifty mile radius is examined, the ratio of sewage sludge to fly ash is 5:1. If the radius is expanded to 100 miles for fly ash, the sewage sludge to fly ash ratio is 3:1 (Berenyi and Gould, 1993) and (EPA, 1992 (based on 47 dry lbs/sewage sludge /person/day)).

Ribbon blenders, which are hoppers with a heavy shaft and paddles, can be used to mix sewage sludge and fly ash at the port.

Physical and Chemical Properties

	Dredge Material	Sewage Sludge	Fly Ash
Specific Gravity (By Weight)	1.25	1.04****	2.04
% Solid Content	32%	20%*	85%
% Volatile Material in Solids	varies	60-80% (raw) 30-60% (digested)	
% Organic	10%	35-80% **	<1-15%
% Insoluble in Water		90-95%	<.3%
% Ignition Loss			.8-16%
Size of Particles	silt 3.9-63.5um sand 625-2,000um gravel 2,000um		1-1000um
Composition	sand, silt, & other sediments. (range of contaminants varies w/source)	55% elemental C	50% SiO_2
Energy/ 1lb.		6,000-12,000 BTU/lb (raw) 3,000-6,000 BTU/lb (digested)	n/a
pH	n/a	5-8	
Misc		Odor/pathogens, Gas production***	

* Location of Water %: The 80% water is Adsorption/Internal

** 35% if digested.

***Gas Analysis Methane 0-75%

****Sewage Sludge and Fly ash can be mixed to obtain a specific gravity of 1.25

Table 2
Physical and Chemical Properties

ANNUAL QUANTITIES OF WASTE STREAMS GENERATED

WASTE STREAM	TOTAL QUANTITY OF WASTE GENERATED (MILLIONS OF METRIC TONS)	TOTAL QUANTITY OF WASTE APPLICABLE TO APWI (MILLIONS OF METRIC TONS)
DREDGED MATERIAL	400[1]	20[5]
SEWAGE SLUDGE	5.3 (DRY)[2],[3] 26.5 (AT 20% SOLID)	26.5[2],[3]
INCINERATOR FLY ASH	1.5[4]	1.5[4]

(1) Marine Policy Center, Woods Hole Oceanographic Center, 1991.

(2) Environmental Protection Agency, 1993.

(3) Based on 47 dry lbs sewage sludge/person/day at 20%.

(4) Berenyi and Gould, 1993.

(5) Zarba, 1989

Table 3
Annual Quantities of Waste Streams Generated

4.3 WEATHER/SITE REQUIREMENTS:

Current profile versus bottom depth (based on a 500 data point data base) is shown in Figure 3. This figure summarizes the worst case envelope of maximum expected current anyplace in the world. NRL- supplied data for bottom current at the five designated Abyssal Plains Waste Isolation sites is overlaid on this figure, identified as A-E in the legend. Figure 4 shows the location of the five Deep Ocean Isolation sites proposed by NRL. Distances to these sites from the ports to be used are shown in Table 4.

In Figure 5, the relationship between Operational Availability versus Seastate Limitations is shown. Operational Availability is defined as the days per year a system is capable of performing normal operations. Seastates were drawn from standard tables incorporating wave height with sustained winds. Figure 5 illustrates the difference in operational days of a system when allowed to operate in conditions up to seastate four versus seastate five. The number of days per year each site is at seastate four and below was counted; the same was done for seastate five. The number of days for seastate four and five at the five sites were converted into annual availability percentages shown on Figure 5. By calculating the average for the five sites, 69% availability is obtained when the system is designed to operate in seastate five versus 57% if only allowed to operate in seastates four and below. Seastate five is chosen as the upper limit for equipment operations because it gives a significant advantage in operational availability and it is already a standard for open ocean operations. For surviving unexpected weather conditions, the system will be built to survive seastate eight conditions without the loss of equipment. The operating temperature ranges and pressures at abyssal depths are also system level requirements; these values are discussed in SECTION 4.5. The system level requirements with regard to weather/site conditions are also discussed in Section 4.5 under the category of Environmental.

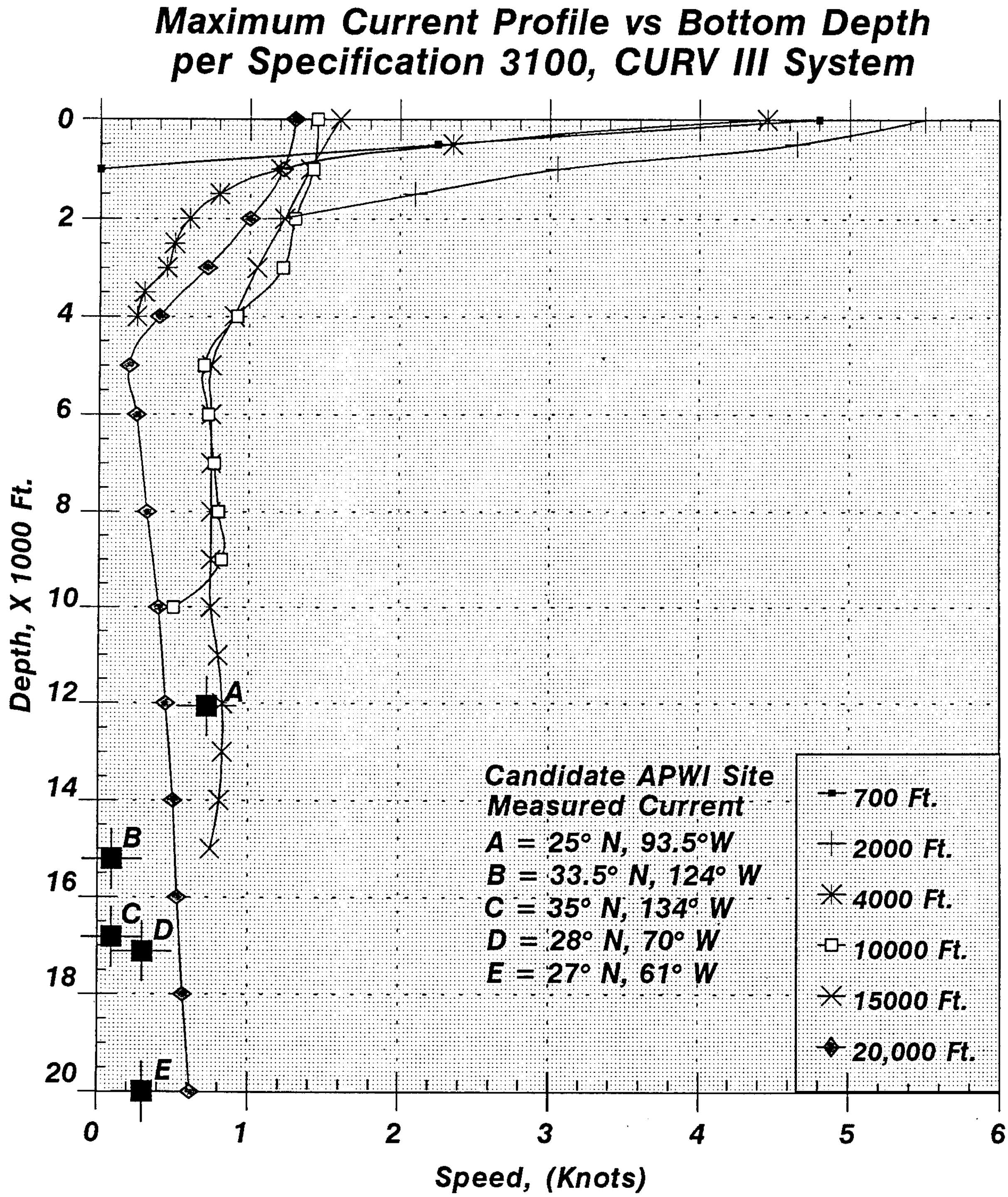

Figure 3
Maximum Current Profile vs. Bottom Depth

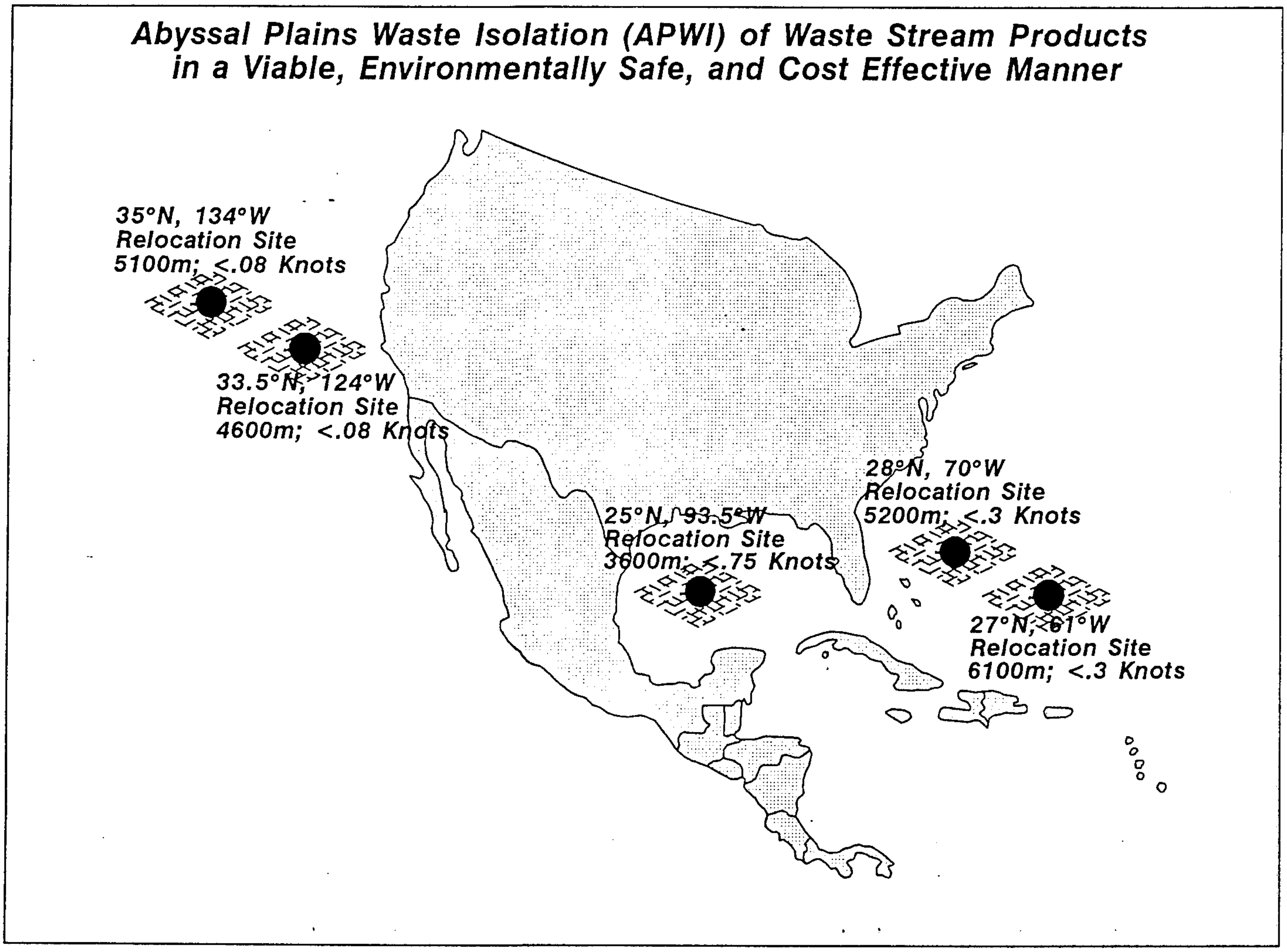

Figure 4
APWI Candidate Site Locations

PORT TO SITE TRANSITING DISTANCES (IN NAUTICAL MILES)

ATLANTIC SITES

PORT	DISTANCE TO SITE 28°N,70°W	DISTANCE TO SITE 27°N,61°W
Boston	864.3146 (1600.7km)	1045.739 (1936.7km)
New York	787.3392 (1458.2km)	1044.659 (1934.7km)
Philadelphia	757.9052 (1403.6km)	1045.842 (1936.9km)
Baltimore	751.8251 (1392.4km)	1071.944 (1985.2km)
Norfolk	625.9416 (1159.2km)	980.8830 (1816.6km)
Wilmington, NC	553.2456 (1024.6km)	975.0280 (1805.8km)
Charleston	588.1374 (1089.2km)	1042.159 (1930.1km)
Savannah	624.9712 (1157.4km).	1089.693 (2016.8km)
Jacksonville	625.3720 (1158.2km)	1102.974 (2042.7km)
Port Canaveral	559.7861 (1036.7km)	1042.399 (1930.5km)
Miami	560.6048 (1038.2km)	1032.479 (1912.2km)
Mean Distances	663.6 (1229.0km)	1043.1 (1931.8km)

GULF SITE

PORT	DISTANCE TO SITE 25°N,93.5°W
Tampa	619.0176 (1146.4km)
Gulfport	397.6445 (736.4km)
Galveston	267.1648 (494.8km)
Brownsville	218.7925 (405.2km)
Mean Distances	375.7 (695.8km)

PACIFIC SITES

PORT	DISTANCE TO SITE 33.5°N,124°W	DISTANCE TO SITE 35°N,134°W
Anchorage	1939.891 (3592.7km)	1686.535 (3123.5km)
Valdez	1869.668 (3462.6km)	1637.793 (3033.2km)
Kodiak	1854.179 (3443.9km)	1553.116 (1876.4km)
Port Angeles	878.188 (1626.4km)	917.936 (1700.0km)
Seattle	851.155 (1576.3km)	920.164 (1704.1km)
Vancouver	730.366 (1352.6km)	820.161 (1518.9km)
Portland	726.554 (1345.6km)	815.810 (1510.9km)
San Francisco	269.242 (498.6km)	583.467 (1080.6km)
Port Hueneme	241.403 (447.1km)	731.287 (1354.3km)
Los Angeles	286.592 (530.8km)	782.072 (1448.4km)
San Diego	343.382 (635.9km)	845.628 (1564.9km)
Mean Distances	540.9 (1001.7km)	802.1 (1485.5km)

Table 4
Tabulation Candidate Port to Site Transiting Distances

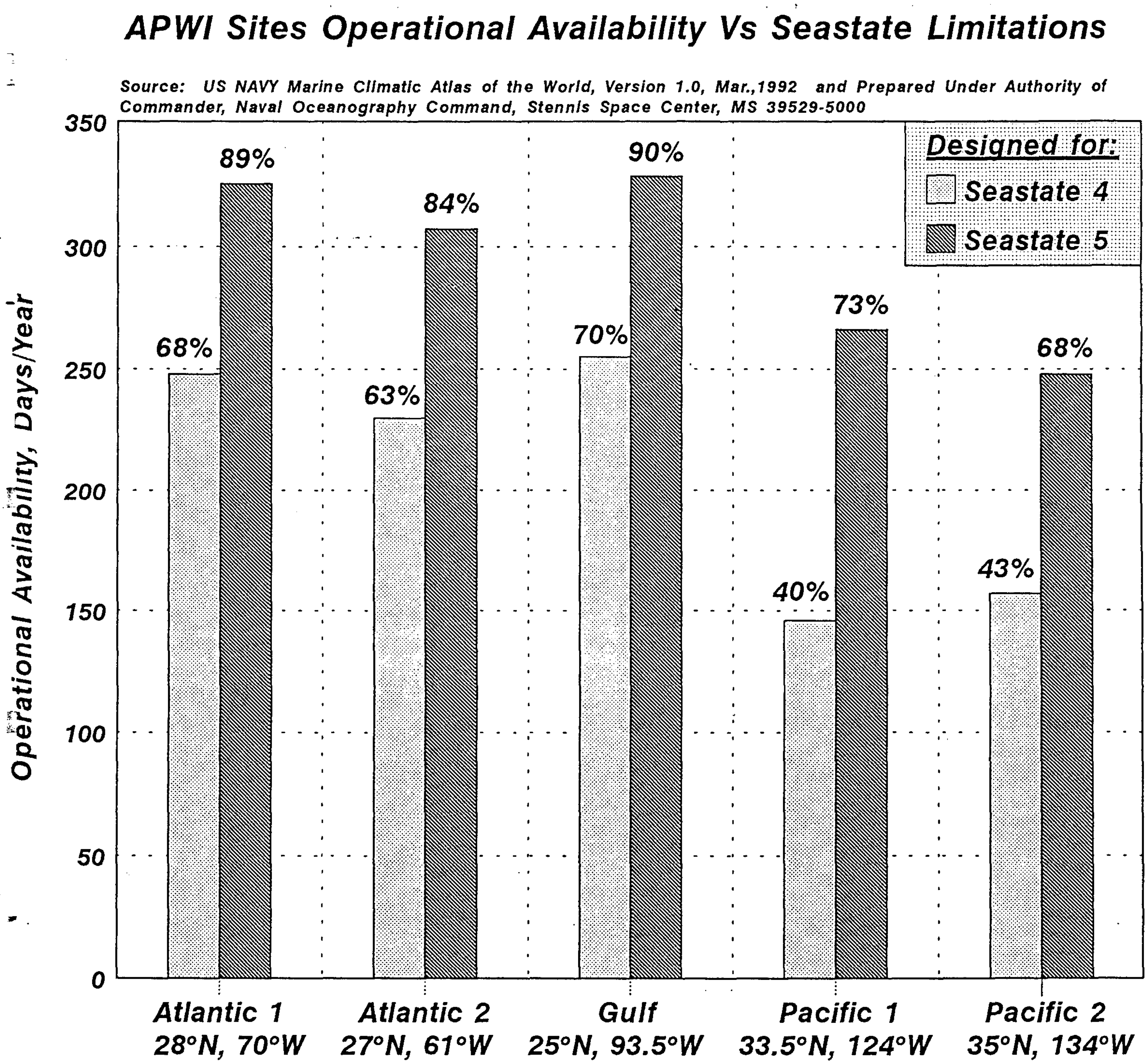

Figure 5
APWI Candidate Sites-Operational Availability vs. Seastate

4.4 EXISTING REGULATIONS FOR VESSELS:

Research from standard regulations for ocean going vessels led to regulatory design constraints regarding different vessel types. Requirements were researched for self powered vessels, surface barges, submersible barges, moored platforms, and associated equipment. These regulatory design constraints are straight forward and led to general system level requirements from sources listed under Design Requirements in Section 4.5.

4.5 SYSTEM PERFORMANCE/OPERATIONAL REQUIREMENTS:

Table 5 lists general performance and operational requirements that any candidate waste handling system must meet. The following rationale was used to derive these values. The numbered items below correspond with the numbers on the table.

1a. **System Capability: 2.5 Million Metric Tons/Yr. per Port.** From Table 3, the total U.S. waste stream quantity applicable to APWI is approximately 48 million metric tons/year. Distributing this quantity evenly over the 22 major U.S. port cities, the average waste stream per port is approximately 2.5 million metric tons/year. Given that many ports will vary from the average, this transfer rate is considered to be more of a design goal than a firm requirement. However, it gives general guidance to the engineering effort regarding basic equipment sizing/ capacity. This value may be modified during the concept definition phase of the engineering study effort.

1b. **<1000 Nm Transiting Distance from Coastal Ports.** This value is a core requirement for this study.

1c. **System Capability: No Exposure of Waste Stream Products to the Intervening Water Column, Including Leakage and Spill Prevention Design Features.** This is considered to be a mandatory requirement. Inability to meet this requirement eliminates any candidate system concept from further consideration.

1d. **System Capability: Static Electricity Dissipation Design Features.** Safety considerations and vessel regulations dictate that means be incorporated into the APWI system to assure adequate grounding between the vessel and dockside facilities, and/or the vessel and emplacement facilities. Dangerous levels of static charge can be developed as a result of processing plant connectivity and/or material flow through conductive transfer lines.

1e. **System Capability: Validation & Verification IAW TBD.** Specific requirements for validation and verification will be established as a result of the detailed APWI system concept definition(s) for any of the candidate system approaches. The need for validation and verification will be as a result from a determination of engineering or developmental risk.

1f. **System Capability: Range Safety Design Features IAW TBD.** Similar to Validation & Verification.

SYSTEM PERFORMANCE/ OPERATIONAL REQUIREMENTS

1. System Capability:
   a. 2.5 Million Metric Tons/Yr. per Port
   b. Maximum Transiting Distance to Atlantic; Gulf; or Pacific APWI Sites from any Coastal Port < 1000 nautical miles (1852km)
   c. No Exposure of Waste Stream Products to Intervening Water Column, including Leakage & Spill Prevention Design Features
   d. Static Electricity Dissipation Design Features
   e. Validation & Verification IAW TBD
   f. Range Safety Design Features IAW TBD

2. Transiting Speed: 6.2 m/s (12 knots), Minimum

3. Operational Depth: 6700 Meters, Maximum

4. Emplacement Accuracy: < 500 m.sq.

5. Reliability: MTBF > TBD

6. Maintainability: MTTR < TBD

7. Environmental:
   a. Operational: Sea State 5 Conditions
   b. Survivability: Sea State 8 Conditions
   c. Currents: < 0.78 m/s (1.50 knots) on Surface; < 0.39 m/s (.75 knots) on Abyssal Sea Floor
   d. Hydrostatic Pressure: $< 6.2 \times 10^7$ Pa (9000 psig)
   e. Temperature: 0 Deg. C to 49 Deg. C

8. Waste Stream Compatibility: (Non-Hazardous)
   a. Contaminated Dredge Sediments: 32% Solids by Weight
   b. Sewage Sludge: 20% Solids by Weight
   c. Municipal Fly Ash: 85% Solids by Weight

9. Design Requirements:
   a. American Bureau of Shipping
   b. Code of Federal Regulations 33, 40, 46 & 49 CFR
   c. Safety of Life At Sea (SOLAS)
   d. American Petroleum Institute API RP 2A
   e. Interface Std. for Shipboard Equipment, DOD STD-1399

Table 5
System Performance/Operational Requirements

2. **Transiting Speed: 6.2 m/s (12 Knots), Minimum.** A best estimate for achievable transiting speed is 15 knots for "large" capacity self-propelled bulk carriers, and approximately 12 knots for integrated tow barge/scow configurations. The 12 knots is a conservative value selected to account for typical ocean-going tugs that might be employed for an APWI candidate system.

3. **Operational Depth: 6700 Meters, Maximum.** This value provides a 10% margin vs designated APWI site locations, and reflects typical capability of Navy and commercial ROV work vehicles to operate at equivalent depths. The submersible portions of the system will be designed to withstand pressure at this depth.

4. **Emplacement Accuracy: <500 Meters Square.** The goal of emplacement accuracy is to minimize the active disposal area. Based upon Oceaneering's deep ocean experience, a 500 m X 500 X 500 m target at 6700 m depth is a practical target for guided and unguided payload emplacement.

5. **Reliability: MTBF > TBD.** Figures of Merit for system reliability (mean time between failure, MTBF) will be established as part of the detailed concept definitions.

6. **Maintainability: MTTR > TBD.** Figures of Merit for system maintainability (mean time to repair, MTTR) will also be established as part of the detailed concept definitions. Determination of both the MTBF and MTTR allows a prediction of the system operational availability (A_o) = MTBF/(MTBF + MTTR).

7a. **Environmental: Operation in Seastate 5 Conditions.** System design concepts must be capable of operation under seastate 5 conditions. As noted in Figure 5, any reduction in capability would result in a significant reduction in the available number of operational days, by 25 to 50% dependant upon the site location. Deep water operations in seastate 5 conditions are typical of current Navy and commercial operating limits.

7b. **Environmental: Survivability in Seastate 8 Conditions.** This is required for open ocean operations, far from shore, and reflects the inability of candidate systems to "run for cover."

7c. **Environmental: Current <0.78 m/s (1.5 Knots) on Surface, and <0.39 m/s (0.75 Knots) on Abyssal Sea Floor.** These values for currents are based upon 500 data points, which identify worst-case conditions scattered around the world's oceans.

7d. **Environmental: Hydrostatic Pressure <6.66 X 10^7 Pa (<9700psig).** Refer to requirement 3.

7e. **Environmental: Temperature 0 Deg. C to 49 Deg. C.** This temperature range reflects typical operating temperature extremes for Navy and commercial ROV handling systems and work platforms.

8. **Waste Stream Compatibility: (Non-Hazardous).** The selected values reflect source levels, with the higher values where indicated, showing the potential dewatering values.

9. **Design Requirements: As Listed, for any new or modified ocean-going equipment. This equipment.** This equipment must meet established standards for design, fabrication and operation.

5.0 CONCLUSIONS

A conservative set of system level requirements were identified. Candidate waste handling systems must be able to adhere to these requirements while handling the three waste streams. These requirements are applicable to all waste streams, providing extremely low or no risk of contamination between port and final emplacement.

System level requirements were derived from literature searches of environmental regulations, physical and chemical characteristics of the three waste streams, weather conditions from site to port, site conditions, and existing vessel design constraints.

5.1 ENVIRONMENTAL REGULATIONS:

Environmental regulations pertinent to APWI were extracted from:

- 40 CFR Protection of the Environment
- 49 CFR Transportation
- 46 CFR Shipping
- 29 CFR Labor
- 33 CFR Navigation and Navigable Waters
- Marine Protection, Research and Sanctuaries Act (MPRSA)
- Resource Conservation and Recovery Act (RCRA)
- Clean Water Act
- 58 FR 9248 Standards for the Use and Disposal of Sewage Sludge
- MIL-HDBK-1005/8 Domestic Wastewater Control
- Technical Notes from US Army Corps of Engineers Environmental Effects of Dredging

These extracted regulations were placed in procedural order with respect to handling, transportation, and emplacement in Appendix B (drawing # DM-103175). Sixty-nine environmental regulatory system level requirements were derived from the text blocks of the flow diagram (Appendix B).

Although regulations were written by different agencies at different times, they flow together in a logical and consistent manner. Relationships between the different regulations is shown in this flowchart. By placing the environmental regulations in the flow diagram, it is shown that both hazardous and nonhazardous waste are judged by the same criteria in the permitting process for oceanic emplacement. Primary design constraints are being driven by this permitting approval process. Derived system level environmental regulatory requirements were significantly larger in number than all other categories of system level requirements combined. To date, no inconsistencies in regulatory information have been discovered.

5.2 WASTE STREAM CHARACTERISTICS:

Physical and chemical properties of dredged material, sewage sludge, and municipal incinerator fly ash were extracted from reference material. These waste streams are very source specific. This means that from location to location values of these physical and chemical properties will vary greatly. Some differences in physical and chemical properties of these waste streams can be accounted by differences in the properties in the raw waste stream before treatment. The chemical and physical properties of these wastes also vary greatly over time in the same location. These variances are caused by different sewer designs and sewage treatment technologies available for municipalities, different types of municipal solid waste incinerators, and different dredging methods used. Another reason for the variances in values is geographical differences in the raw materials that make up these wastes. Components of raw sewage vary greatly by location. Communities or cities produce different solid wastes from one another. When solid wastes with different properties are burned, the ash produced will vary in properties. Types of sediments present in bodies of water in different locations will yield dredge material with varying properties. Over time in the same location, materials can vary. Sewage sludge varies over time. Municipal incinerators may lose some efficiency or the solid waste over time changes with development of new technologies to package products. Dredged materials taken from the same location may vary for reasons such as an industrial plant closing (elimination of a pollution point source) or a construction of a dam resulting in a change in a river's current. Since the physical and chemical property values of these three waste streams varied in the reference material because of reasons expanded upon above, all values were taken into account and expressed in range form in the Physical and Chemical Properties table (Table 2) in the RESULTS section. System level requirements with respect to materials handling were taken from values in this table. NRL is addressing the variability in physical and chemical properties of these three waste streams by assigning average values for these properties to base system level design requirements.

5.3 WEATHER/SITE CONDITIONS:

Average weather conditions, current conditions, pressure at depths of emplacement, and temperatures were considered for the five emplacement sites selected by NRL and the ports from which the waste streams will be collected. Baseline values selected for operational and survivability system level design requirements based on weather and current conditions, expressed as sea states, are within norms already established for open ocean operations. The submersible portions of the system will be designed to withstand pressure at abyssal depths. The system will also be designed to prevent failure in high or low temperatures and to transit the large distances from ports to the emplacement sites.

5.4 VESSEL DESIGN CONSTRAINTS:

Performance operational requirements and regulatory design constraints are baseline parameters within norms previously established for existing cargo transport.

5.5 SUMMARY:

Based on the system level requirements from environmental regulations, physical and chemical properties of the waste streams, weather and site conditions, and existing vessel design constraints, the implementation of design assumptions will be conservative by complying with these top level system requirements. These requirements are applicable to all waste streams, providing low risk of contamination between port and final emplacement. This design will also provide the most realistic and cost effective solution regarding waste streams and percent solids content.

6.0 REFERENCES

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APPENDIX A

DERIVED ENVIRONMENTAL REGULATORY REQUIREMENTS

HAZMAT: (Preparation & Packaging)

1. Use of approved containers if material is ignitable/ flammable, corrosive, reactive or toxic, per 49 CFR 172.101, or 171.8.

HAZMAT: (Personnel)

1. HAZWOPER per 29 CFR, 1910.120e for Personnel Training.
2. Written Safety & Health Program requirements, per 1910.120b.
3. Personnel Site Analysis & Control requirements, per 1910.120c.
4. Personnel Exposure to Hazmat requirements, per 1910.120d.
5. Medical Surveillance Program requirements, per 1910.120f.
6. Personnel Work Practices & Protective Equipment requirements, per 1910.120g.
7. Site Monitoring Program per 1910.120h, as necessary.
8. Informational Program per 1910.120i.
9. Container Handling requirements per 1910.120j.
10. Decontamination IAW requirements per 1910.120k.
11. Site Illumination and Sanitation requirements per 1910.120m/n.

HAZMAT: (Transportation to Port)

1. EPA ID# per EPA form 8700-12.
2. Manifest IAW 40 CFR 262.20, and EPA form 8700-22.
3. Container Marking IAW 49 CFR 172.300, Subpart D.
4. Container Labeling IAW 49 CFR 172.300, Subpart E.
5. Vehicle Loading, General, IAW 49 CFR 177.834.
6. Vehicle Loading, Specific, IAW 49 CFR 177.835/.842.
7. Segregation & Separation IAW 49 CFR 177.848.

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8. Disabled Vehicle/ Accident Procedures IAW 49 CFR 177.853/.861.

HAZMAT: (Loading, Stowage & Carriage Aboard a Vessel, General)

1. Shipping Papers IAW 49 CFR 176.24.

2. Certificate IAW 49 CFR 176.27.

3. Dangerous Cargo Manifest IAW 49 CFR 176.30.

HAZMAT: (Loading, Stowage & Carriage Aboard a Vessel, Containerized)

1. General Stowage requirements IAW 49 CFR 176 Subpart C, if vessel freight container/ barge possesses fixed fire extinguishers.

2. Segregation/ Separation IAW 49 CFR 176.83.

3. Special Requirements for Barges IAW 49 CFR 176.95/ .98.
   - 176.96 requires steel construction
   - 176.97 prohibits dump scows with hoppers, and bottom or side dump features
   - 176.98 permits "under deck" stowage of materials per Col. 10 of Hazardous Materials Table 172.101, (if using unmanned barge)

4. Specific Loading and Stowage requirements IAW 49 CFR 176 Subparts F-O.

HAZMAT: (Loading, Stowage & Carriage Aboard a Vessel, Non Containerized)

1. Solid Hazmat Cargoes Bulk Transport IAW 46 CFR 148.01-9.

2. U.S.C.G. Special Permit for Materials Not Listed, IAW 46 CFR 148.01-.09.

3. Rules for Identification of Incompatible Hazmat/ Carrying in Bulk IAW 46 CFR Part 150.

4. Liquid Hazmat Cargoes Bulk Transport IAW 46 CFR 151.0, Using Non Self-Propelled Vehicles.

5. U.S.C.G. Special Permit for Materials Not Listed, IAW 46 CFR 151.05.

6. U.S.C.G. Commandant Approval for Vessels of Novel Design and/or Conversion, IAW 46 CFR Part 151.

7. Certifications and Inspection of Unmanned Barges Carrying Liquid Hazmat Cargoes IAW 46 CFR 151.04.

8. Liquids Transport Minimum Requirements IAW 46 CFR 151.05.

9. Cargo Segregation, Tanks, Piping, and Venting IAW 46 CFR 151.13, and .15.

10. Cargo Transfer, Tanks, Piping, and Venting IAW 46 CFR 151.20.

11. Cargo Protection/ Environmental Control Requirements IAW 46 CFR 151.25.

12. Portable Fire Extinguishers, if Required per 151.05, IAW 46 CFR 151.30.

13. Operations Requirements for Barges Certified as Tank/ Cargo Barges IAW 46 CFR 151.45.

14. Special Requirements for Certain Bulk Hazardous Material Cargoes IAW 46 CFR 151.50.

OCEANIC EMPLACEMENT

1. MPRSA 1401b/c U.S. Regulatory Policy for Transportation from U.S. of Materials for Ocean Dumping.
   - o 1988 Amendment (Ocean Dumping Ban) after Dec.,31, 1991
   - o MPRSA Section 1411 prohibitions unless permit, for transport and dumping

2. Clean Water Act U.S. Regulatory Policy for Permitting of both Dredged materials and Sewage Sludge, as listed in 40 CFR.
   - o Sewage Sludge banned with 1988 MPRSA Amendment
   - o 56 FR 9248 for Sewage Sludge standards (no current EPA)

3. London Dumping Convention, Annex I, II,& III (Prohibited, Restricted and Allowed)
   - o Currently no restrictions/ requirements for abyssal plains

PERMITTING

1. Permit processing for Dredged Material IAW 33 CFR 209, with information provided in 40 CFR 225.2.

2. Permit processing for Sewage Sludge & Fly Ash IAW 40 CFR 220.4 with information provided in 40 CFR 221.1.

PERMITTING EVALUATION CRITERIA

1. Evaluation Criteria for granting of permit IAW 40 CFR Part 227.
   - o Environmental Impact IAW 227.4
   - o Prohibited Compounds IAW 227.6 (Other than Trace Quantities)
   - o Limitations re Containment; Disposal Rate & Quantity IAW 227.7:
     --Non soluble constraint
     --Radioactive constraint
     --Etiological constraint (e.g.--"new species")
     --High alkalinity or acidity constraint

2. Limitation of Permissible Concentration IAW 227.27. / Limitation on Permissible Quantity IAW 227.9.

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3. Waste & Site Non-Interference with Navigation and Fishing IAW 227.10.

4. Containers Designed to Rupture/ Leak on Impact, acceptable with constraints IAW 227.6/.10.

5. Other Containers IAW 227.11:
   - o Contained materials decay/ decomposition at rate > container
   - o Only short term local effects if containers rupture
   - o Placement location and depth cause no threat to navigation, fishing, shorelines and/or beaches

6. Waste Stream/Container Materials IAW 227.12:
   - o < Trace limiting concentrations
   - o Settleable/ with particle size and density sufficient for maintaining deposit stability
   - o Persistent inert synthetic materials must remain in place on the sea floor.

8. Need for Ocean Dumping IAW 227.15:
   - o Degree of waste pretreating
   - o Risks/ Impact & Cost vs alternatives
   - o Associated raw materials manufacturing processes

9. EPA Administrative Considerations IAW 227.16:
   - o Consideration of possible improvements to proposed method(s) vs cost/ environmental impact and permit duration

10. Esthetic Recreational & Economic Impact Assessment IAW 227.17.

11. Other Uses of Ocean Impact Assessment IAW 227.20:
    - o Commercial and recreational fishing
    - o Commercial and recreational navigation
    - o Exploitation of living and non-living marine resources

<u>PERMITTING SITE SELECTION</u>

1. Site Selection IAW 40 CFR 228.5:
   - o General requirements IAW 228.5
   - o Specific requirements IAW 228.6:
     --Sewage sludge and fly ash require no additional permits
     --Dredge material requires site specification/ mat'l permits

2. Dredge Material Site Specification/ Permits IAW 40 CFR 230.10:
   - o Practicality vs cost of alternatives
   - o Meets evaluation criteria
   - o Incorporates steps to minimize adverse effects IAW 230.70

3. Factual Determinations IAW 40 CFR 230.10, for Effects:
   - o Biological
   - o Physical

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o Geological

4. Dredged Material Evaluation & Test IAW 40 CFR 260 Subpart G:
   o Threshold concentrations IAW Table 1 of National Prospective of Sediment Quality

MANAGEMENT/MONITORING/RECORDS & REPORTS

1. Management/ Monitoring/ Records & Reports IAW 40 CFR Part 228:
   o Disposal site management responsibility
   o EPA Region oversight IAW 40 CFR 228.3

2. Monitoring requirements IAW 228.9:
   o EPA evaluation IAW 228.10

3. Records Keeping IAW 224.1:
   o Physical & chemical characteristics
   o Time & location of dumping
   o Other conditions required by the permit

4. Reports IAW 224.1:
   o 30 Days prior to six month intervals
   o 30 Days prior to permit expiration
   o Any incidence of emergency dumping

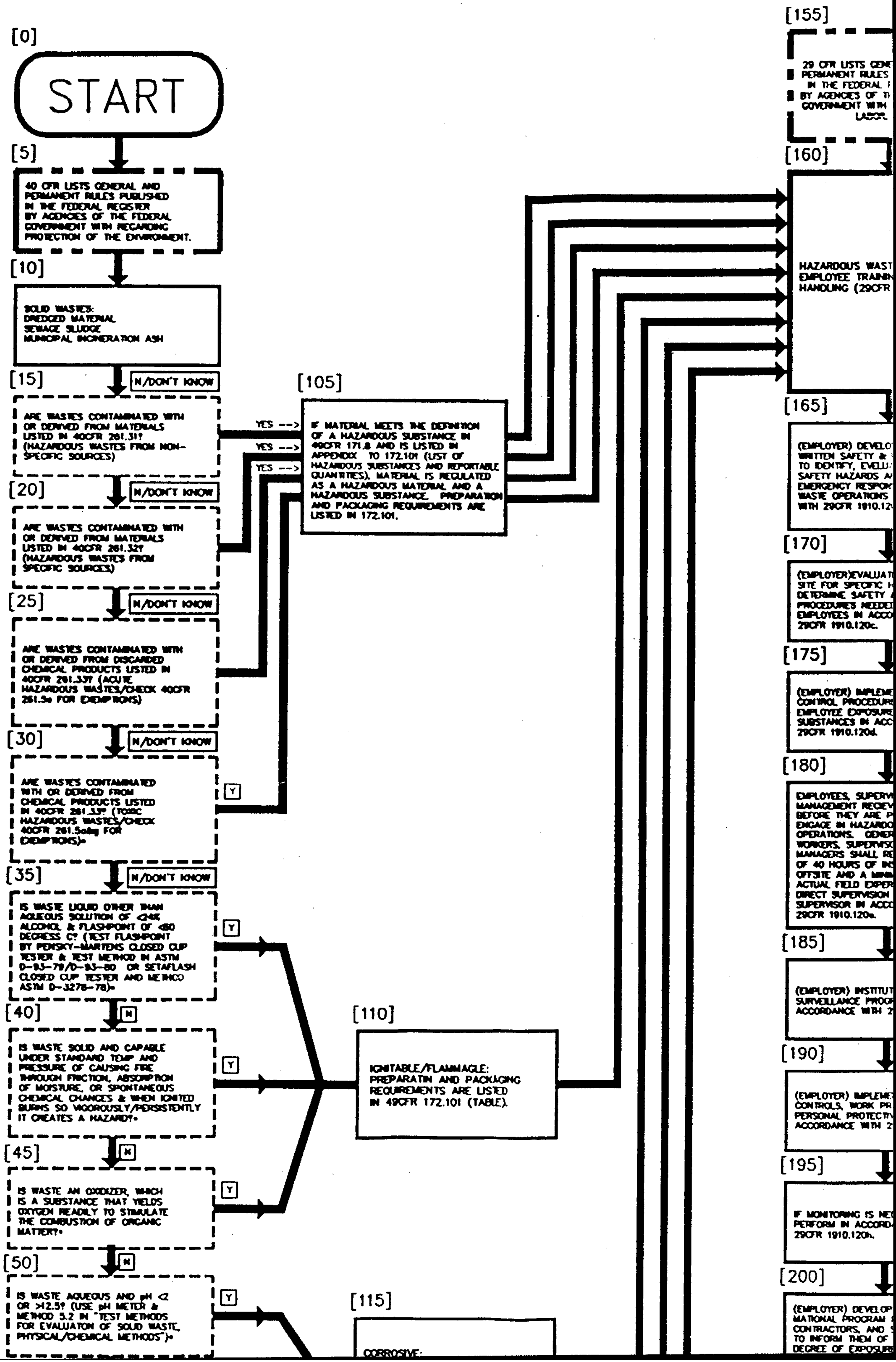
NON-HAZARDOUS: (Fly Ash; Sewage Sludge & Dredged Material)

1. Fly Ash Residue to be Drained of Free Moisture and Transported to Prevent Loads from Shifting, Falling, Leaking or Blowing from Container IAW 40 CFR 240.206-3b.

2. Methods for Loading Sewage Sludge for Transport IAW MIL-HDBK-1005/8.
   o Elevated storage hopper filled using belt/ bucket or elevator or tubular conveyors at incline <25 Deg.
   o Elevated filter discharge directly into hopper
   o Dump boxes drop off and picked up using self loading vehicles
   o Long distance transport in tank body trucks
   o Explosive gas ventilation considerations

3. Guidelines for Sewage Sludge Pumps/ Valves & Fittings IAW para.5.7, Tables 14 & 16.

4. COE WES Primary Emphasis for Dredged Material Transport is on Spill/ Leak Prevention:
   o Pipeline routes, climatic conditions, material cres. resistance, safety device redundancy, coupling methods and systems for leak detection
   o Scow/ barge transport controls to prevent spread of contaminated material, focused on loading/ unloading, fugitive emissions, route and navigation hazards, decontamination of equipment, and use of flexible connections to reduce possibility of pipe damage.
   o Truck/ Rail transport controls similar to scow/ barge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40 CFR LISTS GENERAL AND PERMANENT RULES PUBLISHED IN THE FEDERAL REGISTER BY AGENCIES OF THE FEDERAL GOVERNMENT WITH REGARDING PROTECTION OF THE ENVIRONMENT.
[10]
SOLID WASTES: DREDGED MATERIAL SEWAGE SLUDGE MUNICIPAL INCINERATION ASH
[15]
N/DON'T KNOW
ARE WASTES CONTAMINATED WITH OR DERIVED FROM MATERIALS LISTED IN 40CFR 261.31? (HAZARDOUS WASTES FROM NON-SPECIFIC SOURCES)
[20]
N/DON'T KNOW
ARE WASTES CONTAMINATED WITH OR DERIVED FROM MATERIALS LISTED IN 40CFR 261.32? (HAZARDOUS WASTES FROM SPECIFIC SOURCES)
[25]
N/DON'T KNOW
ARE WASTES CONTAMINATED WITH OR DERIVED FROM DISCARDED CHEMICAL PRODUCTS LISTED IN 40CFR 261.33? (ACUTE HAZARDOUS WASTES/CHECK 40CFR 261.5e FOR EXEMPTIONS)
[30]
N/DON'T KNOW
ARE WASTES CONTAMINATED WITH OR DERIVED FROM CHEMICAL PRODUCTS LISTED IN 40CFR 261.33? (TOXIC HAZARDOUS WASTES/CHECK 40CFR 261.5a&g FOR EXEMPTIONS)•
Y
[35]
N/DON'T KNOW
IS WASTE LIQUID OTHER THAN AQUEOUS SOLUTION OF <24% ALCOHOL & FLASHPOINT OF <60 DEGRESS C? (TEST FLASHPOINT BY PENSKY-MARTENS CLOSED CUP TESTER & TEST METHOD IN ASTM D-93-79/D-93-80 OR SETAFLASH CLOSED CUP TESTER AND METHOD ASTM D-3278-78)•
Y
[40]
N
IS WASTE SOLID AND CAPABLE UNDER STANDARD TEMP AND PRESSURE OF CAUSING FIRE THROUGH FRICTION, ABSORPTION OF MOISTURE, OR SPONTANEOUS CHEMICAL CHANGES & WHEN IGNITED BURNS SO VIGOROUSLY/PERSISTENTLY IT CREATES A HAZARD?•
Y
[45]
N
IS WASTE AN OXIDIZER, WHICH IS A SUBSTANCE THAT YIELDS OXYGEN READILY TO STIMULATE THE COMBUSTION OF ORGANIC MATTER?•
Y
[50]
N
IS WASTE AQUEOUS AND pH <2 OR >12.5? (USE pH METER & METHOD 5.2 IN "TEST METHODS FOR EVALUATON OF SOLID WASTE, PHYSICAL/CHEMICAL METHODS")•
Y
YES -->
YES -->
YES -->
[105]
IF MATERIAL MEETS THE DEFINITION OF A HAZARDOUS SUBSTANCE IN 49CFR 171.8 AND IS LISTED IN APPENDIX TO 172.101 (LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES). MATERIAL IS REGULATED AS A HAZARDOUS MATERIAL AND A HAZARDOUS SUBSTANCE. PREPARATION AND PACKAGING REQUIREMENTS ARE LISTED IN 172.101.
[110]
IGNITABLE/FLAMMAGLE: PREPARATIN AND PACKAGING REQUIREMENTS ARE LISTED IN 49CFR 172.101 (TABLE).
[115]
CORROSIVE:
[155]
29 CFR LISTS GENE
PERMANENT RULES
IN THE FEDERAL
BY AGENCIES OF T
GOVERNMENT WITH
LABOR.
[160]
HAZARDOUS WAST
EMPLOYEE TRAININ
HANDLING (29CFR
[165]
(EMPLOYER) DEVELO
WRITTEN SAFETY &
TO IDENTIFY, EVELU
SAFETY HAZARDS A
EMERGENCY RESPON
WASTE OPERATIONS
WITH 29CFR 1910.12
[170]
(EMPLOYER)EVALUAT
SITE FOR SPECIFIC
DETERMINE SAFETY
PROCEDURES NEEDE
EMPLOYEES IN ACCO
29CFR 1910.120c.
[175]
(EMPLOYER) IMPLEME
CONTROL PROCEDUR
EMPLOYEE EXPOSURE
SUBSTANCES IN ACC
29CFR 1910.120d.
[180]
EMPLOYEES, SUPERV
MANAGEMENT RECIEV
BEFORE THEY ARE P
ENGAGE IN HAZARDO
OPERATIONS. GENER
WORKERS, SUPERVISO
MANAGERS SHALL RE
OF 40 HOURS OF IN
OFFSITE AND A MINI
ACTUAL FIELD EXPER
DIRECT SUPERVISION
SUPERVISOR IN ACCO
29CFR 1910.120e.
[185]
(EMPLOYER) INSTITUT
SURVEILLANCE PROG
ACCORDANCE WITH 2
[190]
(EMPLOYER) IMPLEME
CONTROLS, WORK PR
PERSONAL PROTECTIV
ACCORDANCE WITH 2
[195]
IF MONITORING IS NE
PERFORM IN ACCORD
29CFR 1910.120h.
[200]
(EMPLOYER) DEVELOP
MATIONAL PROGRAM
CONTRACTORS, AND
TO INFORM THEM OF
DECREE OF EXPOSUR

(2)

[155]

29 CFR LISTS GENERAL AND PERMANENT RULES PUBLISHED IN THE FEDERAL REGISTER BY AGENCIES OF THE FEDERAL GOVERNMENT WITH REGARDING LABOR.

[160]

HAZARDOUS WASTE: EMPLOYEE TRAINING FOR HANDLING (29CFR 1910.120)

[165]

(EMPLOYER) DEVELOP & IMPLEMENT WRITTEN SAFETY & HEALTH PROGRAM TO IDENTIFY, EVALUATE AND CONTROL SAFETY HAZARDS AND TO PROVIDE EMERGENCY RESPONSE FOR HAZARDOUS WASTE OPERATIONS IN ACCORDANCE WITH 29CFR 1910.120b.

[170]

(EMPLOYER)EVALUATE & ANALYZE SITE FOR SPECIFIC HAZARDS AND DETERMINE SAFETY & HEALTH CONTROL PROCEDURES NEEDED TO PROTECT EMPLOYEES IN ACCORDANCE WITH 29CFR 1910.120c.

[175]

(EMPLOYER) IMPLEMENT SITE CONTROL PROCEDURES TO CONTROL EMPLOYEE EXPOSURE TO HAZARDOUS SUBSTANCES IN ACCORDANCE WITH 29CFR 1910.120d.

[180]

EMPLOYEES, SUPERVISORS, AND MANAGEMENT RECIEVE TRAINING BEFORE THEY ARE PERMITTED TO ENGAGE IN HAZARDOUS WASTE OPERATIONS. GENERAL SITE WORKERS, SUPERVISORS, AND MANAGERS SHALL RECEIVE A MINIMUM OF 40 HOURS OF INSTRUCTION OFFSITE AND A MINIMUM OF 3 DAYS ACTUAL FIELD EXPERIENCE UNDER DIRECT SUPERVISION OF A TRAINED SUPERVISOR IN ACCORDANCE WITH 29CFR 1910.120e.

[185]

(EMPLOYER) INSTITUTE A MEDICAL SURVEILLANCE PROGRAM IN ACCORDANCE WITH 29CFR 1910.120f.

[190]

(EMPLOYER) IMPLEMENT ENGINEERING CONTROLS, WORK PRACTICES, AND PERSONAL PROTECTIVE EQUIPMENT IN ACCORDANCE WITH 29CFR 1910.120g.

[195]

IF MONITORING IS NECESSARY PERFORM IN ACCORDANCE WITH 29CFR 1910.120h.

[200]

(EMPLOYER) DEVELOP AN INFORMATIONAL PROGRAM FOR EMPLOYEES, CONTRACTORS, AND SUBCONTRACTORS TO INFORM THEM OF THE LEVEL AND DEGREE OF EXPOSURE LIKELY IN ACCORDANCE WITH 1910.120i.

[205]

[245]

49 CFR LISTS GENERAL AND PERMANENT RULES PUBLISHED IN THE FEDERAL REGISTER BY AGENCIES OF THE FEDERAL GOVERNMENT WITH REGARDING TRANSPORTATION.

[250]

TRANSPORTATION OF HAZARDOUS WASTE TO PORT

[255]

APPLY AND OBTAIN AN EPA ID# FOR TRANSPORTER BY USING EPA FORM 8700-12

[260]

(GENERATOR) FILL OUT HAZARDOUS WASTE MANIFEST IN ACCORDANCE WITH 40CFR 262.20. MANIFEST IS EPA FORM 8700-22

[265]

MARK HAZARDOUS WASTE PACKAGES IN ACCORDANCE WITH 49CFR 172.300 (SUBPART D).

[270]

LABEL HAZARDOUS WASTE PACKAGES IN ACCORDANCE WITH 49CFR 172.300 (SUBPART E)

[275]

LOAD HAZARDOUS MATERIALS ONTO VEHICLE IN ACCORDANCE WITH THE GENERAL REQUIREMENTS IN 49CFR 177.834.

[280]

LOAD HAZARDOUS WASTE MATERIALS ONTO MOTOR VEHICLE IN ACCORDANCE WITH SPECIFIC REQUIREMENTS IN 49CFR 177.835-177.842.

[285]

REFER TO 49CFR 177.848 FOR INFORMATION ON SEGREGATION & SEPARATION OF HAZARDOUS MATERIALS.

[290]

REFER TO 49CFR 177.853-177.861 FOR GENERAL/SPECIFIC INFORMATION ON DISABLED VEHICLES/ACCIDENTS.

[295]

49 CFR LISTS GENERAL AND PERMANENT RULES PUBLISHED IN THE FEDERAL REGISTER BY AGENCIES OF THE FEDERAL GOVERNMENT WITH REGARDING TRANSPORTATION.

[300]

LOADING, STOWAGE AND CARRIAGE OF HAZARDOUS MATERIAL ABOARD A VESSEL (49CFR)

[305]

FILL OUT SHIPPING PAPERS IN ACCORDANCE WITH 49CFR 176.24.

[310]

PREPARE CERTIFICATE IN ACCORDANCE WITH 49CFR 176.27.

[315]

FILL OUT DANGEROUS CARGO MANIFEST IN ACCORDANCE WITH 49CFR 176.30.

[318]

IS HAZARDOUS WASTE TO BE TRANSPORTED CONTAINERIZED OR IN BULK?

BULK

CONTAINERIZED

[320]

HAVE ON HAND LABELS TO REPLACE THOSE THAT HAVE BECOME LOST OR DETACHED (USE SHIPPING PAPERS/MANIFEST) AS A REFERENCE.

[325]

REMOVE PREVIOUS CARGO AND DEBRIS IN HOLDS OR COMPARTMENTS IN WHICH WASTE HAZARDOUS WASTE IS TO BE TRANSPORTATED.

[330]

LOAD OR MOVE PACKAGES WITH EQUIPMENT THAT WILL NOT DAMAGE PACKAGES BY PUNCTURE, PRESSURE, OR FAILURE. METAL BALE HOOKS MAY NOT BE USED FOR HAZARDOUS WASTE.

[335]

STOW HAZARDOUS MATERIALS IN A MANNER THAT WILL FACILITATE INSPECTION AND REMOVAL FROM DANGER AND FIRE; MARK PACKAGES "THIS END UP" (GENERAL STOWAGE REQUIREMENTS 49CFR 176 SUBPART C.

[340]

IF VESSEL IS DESIGNED FOR CARRYING MATERIALS IN FREIGHT CONTAINERS OR IN BARGES AND IS EQUIPPED WITH FIXED FIRE EXTINGUISHERS, HAZARDOUS MATERIALS NEED NOT BE STOWED IN THE MANNER STATED IN THE PREVIOUS BOX. FOLLOW GENERAL STOWAGE REQUIREMENTS IN 49CFR 176 SUBPART C.

[345]

REFER TO 49CFR 176.83 FOR INFORMATION FOR SEGREGATION/SEPARATION OF HAZARDOUS MATERIALS.

[360]

46 CFR LISTS GENERA[L] PERMANENT RULES PU[BLISHED] IN THE FEDERAL REG[ISTER] BY AGENCIES OF THE [FEDERAL] GOVERNMENT WITH RE[GARDING] SHIPPING.

[362]

IS BULK WASTE A SO[LID] OR LIQUID?

[365] SO[LID]

CARRIAGE OF SOLID H[AZARDOUS] MATERIALS IN BULK 4[6CFR] PART 148.

[370]

SOLID HAZARDOUS MA[TERIALS] CARGOES LISTED IN 4[6CFR] 148.01-7 MAY BE TR[ANSPORTED] IN BULK ON BOARD V[ESSELS]

[375]

A SPECIAL PERMIT TO [CARRY] SOLID HAZARDOUS CA[RGOES] LISTED IN 46CFR 148 [MUST] BE SUBMITTED TO TH[E COAST] GUARD AND MUST CO[NTAIN] INFORMATION LISTED [IN] 148.01-9.

[380]

TRANSPORTATION AND REQUIREMENTS FOR B[ULK] HAZARDOUS MATERIAL 46CFR 148.03.

[385]

RULES FOR IDENTIFYI[NG] INCOMPATIBLE HAZAR[DOUS] MATERIALS AND RULE[S FOR] CARRYING THESE MAT[ERIALS] IN BULK ARE IN 46CF[R] 150, SUBPART A.

[390]

CARRIAGE OF LIQUID MATERIALS IN BULK SELF PROPELLED VES[SELS] IN 46CFR PART 151.

[395]

LIQUID HAZARDOUS M[ATERIALS] LISTED IN 46CFR 151 BE TRANSPORTED AB[OARD] SELF PROPELLED VES[SELS]

[400]

SPECIAL PERMISSION US COAST GUARD CO[...] IS NEEDED TO TRANS[PORT] BULK LIQUID WASTE [...] IN 46CFR 151.05.

[405]

COMMANDANT MAY A[...] VESSELS OF NOVEL D[ESIGN] BOTH NEW AND FOR[...] IF IT IS SHOWN THAT [...] IS SAFE AND MEETS [...] IN 46CFR 151.

[410]

CERTIFICATION AND I[...]

(3)

[360]
46 CFR LISTS GENERAL AND PERMANENT RULES PUBLISHED IN THE FEDERAL REGISTER BY AGENCIES OF THE FEDERAL GOVERNMENT WITH REGARDING SHIPPING.

[362]
IS BULK WASTE A SOLID OR LIQUID?

BULK

LIQUID

SOLID

[365]
CARRIAGE OF SOLID HAZARDOUS MATERIALS IN BULK 46CFR PART 148.

[370]
SOLID HAZARDOUS MATERIAL CARGOES LISTED IN 46 CFR 148.01-7 MAY BE TRANSPORTED IN BULK ON BOARD VESSELS.

[375]
A SPECIAL PERMIT TO TRANSPORT SOLID HAZARDOUS CARGO NOT LISTED IN 46CFR 148.01-7 MUST BE SUBMITTED TO THE US COAST GUARD AND MUST CONTAIN INFORMATION LISTED IN 46CFR 148.01-9.

[380]
TRANSPORTATION AND STOWAGE REQUIREMENTS FOR BULK SOLID HAZARDOUS MATERIALS ARE IN 46CFR 148.03.

[385]
RULES FOR IDENTIFYING INCOMPATIBLE HAZARDOUS MATERIALS AND RULES FOR CARRYING THESE MATERIALS IN BULK ARE IN 46CFR PART 150, SUBPART A.

[390]
CARRIAGE OF LIQUID HAZARDOUS MATERIALS IN BULK IN NON-SELF PROPELLED VESSELS ARE IN 46CFR PART 151.

[395]
LIQUID HAZARDOUS MATERIALS LISTED IN 46CFR 151.05 MAY BE TRANSPORTED ABOARD NON-SELF PROPELLED VESSELS.

[400]
SPECIAL PERMISSION FROM THE US COAST GUARD COMMANDANT IS NEEDED TO TRANSPORT IN BULK LIQUID WASTE NOT LISTED IN 46CFR 151.05.

[405]
COMMANDANT MAY APPROVE VESSELS OF NOVEL DESIGN BOTH NEW AND FOR CONVERSION IF IT IS SHOWN THAT VESSEL IS SAFE AND MEETS STANDARDS IN 46CFR PART 151.

[410]

(FUTURE)

[455]
OCEANIC EMPLACEMENT

[460]
ACCORDINTG TO MPRSA 1401b, IT IS THE POLICY OF THE US TO REGULATE DUMPING OF ALL TYPES OF MATERIALS INTO OCEAN WATERS AND TO PREVENT/STRICTLY LIMIT THE DUMPING INTO THE OCEAN OF ANY MATERIAL WHICH WOULD ADVERSELY AFFECT HUMAN HEALTH, WELFARE, OR AMENITIES OR THE MARINE ENVIRONMENT, ECOLOGICAL SYSTEMS OR ECONOMICS.

[465]
MPRSA 1401c REGULATES TRANSPORTATION OF ANY MATERIAL FROM THE US, OR ANY VESSELS OR AIRCRAFT FLYING THE AMERICAN FLAG, USED BY AGENCIES WHO TRANSPORT MATERIAL FROM OUTSIDE THE US WHEN FOR THE PURPOSE OF DUMPING MATERIAL INTO OCEAN WATERS.

[470]
1988 AMENDMENT OF MPRSA (OCEAN DUMPING BAN) MADE IT UNLAWFUL AFTER DEC 31, 1991 TO DUMP INTO OCEAN WATERS OR TO TRANSPORT FOR PURPOSE OF DUMPING MATERIAL INTO OCEAN WATERS SEWAGE SLUDGE AND INDUSTRIAL WASTE.

[475]
SECTION 1411 MPRSA PROHIBITS (EXCEPT WHEN A PERMIT IS ISSUED) THE FOLLOWING:
1. TRANSPORTATION FROM THE US IN A VESSEL OR AIRCRAFT REGISTERED IN US OR FLYING THE US FLAG ANY MATERIAL FOR THE PURPOSE OF DUMPING IT IN THE OCEAN.
2. DUMPING OF MATERIAL TRANSPORTED FROM OUTSIDE US INTO THE US TERRITORIAL SEA OR ZONE CONTIGUOUS WITH THE TERRITORIAL SEA.

[480]
CLEAN WATER ACT GOVERNS PERMITTING FOR DREDGED/FILL MATERIAL. THESE PERMITTING PROCEDURES ARE LISTED IN 40CFR. CLEAN WATER ACT ALSO COVERED PERMITTING OF SEWAGE SLUDGE, BUT THAT SECTION WAS NULLIFIED BY THE OCEAN DUMPING BAN.

[485]
THE LONDON DUMPING CONVENTION PROHIBITS DUMPING OF MATERIALS ON ANNEX I AND RESTRICTS DUMPING OF MATERIALS ON ANNEX II. ACCORDING TO LONDON DUMPING CONVENTION, ALL OTHER MATERIALS MAY BE DUMPED AFTER THE ISSUE OF A GENERAL PERMIT; HOWEVER, THE COVER LETTER ATTACHED TO THE LONDON DUMPING CONVENTION STATES THAT ABYSSAL OCEANS HAVE NO SPECIAL REQUIREMENTS REGARDING THE LONDON DUMPING CONVENTION. THIS PROJECT IS SUBJECT TO REGULATIONS OF EPA.

[490]
58FR 9248 (STANDARDS FOR THE USE AND DISPOSAL OF SEWAGE SLUDGE) STATES THAT NO EPA STANDARDS ARE ESTABLISHED FOR THE OCEAN DISPOSAL OF SEWAGE SLUDGE. THIS IS REGULATED BY MPRSA (1988 OCEAN DUMPING BAN AMENDMENT).

[495]
PERMITTING

[500]
TYPES OF PERMITS: 40CFR
1. GENERAL
2. SPECIAL
3. EMERGENCY
4. INTERIM
5. RESEARCH
6. DREDGED MATERIAL

[505]
DREDGED MATERIAL:
ARMY CORPS OF ENGINEERS
DREDGED MATERIAL PERMIT

[510]
APPLICATIONS FOR DREDGED MATERIAL PERMITS ARE FILED WITH THE ARMY CORPS OF ENGINEERS. PROCESSED IN ACCORDANCE WITH 33CFR 209.

[515]
FOLLOWING INFO IS TO BE PROVIDED ON APPLICATION (40CFR 225.2):
1. LOCATION OF PROPOSED DUMP SITE AND ITS BOUNDARIES.
2. STATEMENT WHETHER SITE HAS PREVIOUSLY BEEN DESIGNATED FOR USE.
3. IF SITE HAS NOT PREVIOUSLY BEEN USED, STATEMENT OF WHY NO PREVIOUSLY DESIGNATED SITE IS FEASIBLE, AND A DESCRIPTION OF PROPOSED SITE.
4. KNOWN HISTORICAL USES OF SITE.
5. EXISTENCE AND DOCUMENTED EFFECTS OF OTHER AUTHORIZED DUMPINGS THAT HAVE BEEN MADE IN THE AREA.
6. LENGTH OF TIME DUMPING WILL TAKE.
7. CHARACTERISTICS AND COMPOSITION OF THE DREDGED MATERIAL.
8. PRELIMINARY DETERMINATION OF NEED OF ENVIRONMENTAL IMPACT STATEMENT.

[520]
DISTRICT ENGINEER OR HIS/HER REPRESENTATIVE FORWARDS APPLICATION TO AN ADMINISTRATOR OF THE EPA.

[525]

[530]

[535]

[540]

[545]

[550]

ZONE | REV

4

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OF PERMITS: 40CFR
ERAL
CIAL
RGENCY
ERIM
EARCH
DGED MATERIAL

ED MATERIAL:
CORPS OF ENGINEERS
ED MATERIAL PERMIT

ATIONS FOR DREDGED MATERIAL
S ARE FILED WITH THE ARMY
OF ENGINEERS. PROCESSED IN
DANCE WITH 33CFR 209.

WING INFO IS TO BE PROVIDED
PPLICATION (40CFR 225.2):
TION OF PROPOSED DUMP SITE
D ITS BOUNDARIES.
ATEMENT WHETHER SITE HAS
EVIOUSLY BEEN DESIGNATED FOR
E.
TE HAS NOT PREVIOUSLY BEEN
ED, STATEMENT OF WHY NO
EVIOUSLY DESIGNATED SITE IS
ASIBLE, AND A DESCRIPTION OF
OPOSED SITE.
WN HISTORICAL USES OF SITE.
DENCE AND DOCUMENTED EFFECTS
OTHER AUTHORIZED DUMPINGS
AT
VE BEEN MADE IN THE AREA.
GTH OF TIME DUMPING WILL TAKE.
RACTERISTICS AND COMPOSITION
THE DREDGED MATERIAL.
LIMINARY DETERMINATION OF
D OF ENVIRONMENTAL IMPACT
ATEMENT.

T ENGINEER OR HIS/HER
ENTATIVE FORWARDS
ATION TO AN ADMINISTRATOR
EPA.

[525]
PERMITS THAT COVER SEWAGE SLUDGE AND ASH:
1. GENERAL
2. SPECIAL
3. EMERGENCY
4. INTERIM
5. RESEARCH

[530]
PERMITTING PROCESS FOR SEWAGE SLUDGE AND ASH (40CFR)

[535]
DETERMINE TYPE OF PERMIT NEEDED USING 40CFR 220.3.

[540]
APPLICATIONS FOR GENERAL, SPECIAL, EMERGENCY, INTERIM, OR RESEARCH PERMITS ARE TO BE FILED WITH AN ADMINISTRATOR OF THE EPA AUTHORIZED BY 40CFR 220.4.

[545]
(40CFR 221.1) IN ADDITION TO ANY OTHER MATERIAL WHICH MAY BE REQUIRED, THE APPLICATION MUST CONTAIN:
1. NAME & ADDRESS OF APPLICANT.
2. NAME OF PERSON/FIRM TRANSPORTING, PROCESSING, CONVEYANCE INCLUDING VESSELS, COMMUNICATION, AND NAVIGATION EQUIPMENT.
3. ADEQUATE CHEM/PHYS DESCRIPTION NECESSARY TESTS FOR CRITERIA.
4. NUMBER, SIZE, AND TYPE OF CONTAINERS TO BE DUMPED.
5. QUANTITY TO BE DUMPED.
6. PROPOSED DUMPSITE.
7. PROPOSED METHOD OF RELEASE.
8. ID OF SPECIFIC PROCESS/ACTIVITY GIVING RISE TO MATERIAL.
9. MANNER IN WHICH MATERIAL HAS PREVIOUSLY BEEN DISPOSED OF.
10. STATEMENT OF NEED OF DUMPING.
11. ASSESSMENT OF ENVIRONMENTAL IMPACT.

[550]
PROCESSING FEES:
$1,000.00 FOR EXISTING SITE PLUS $3,000.00 ADDITIONAL TO DUMP IN SITE OTHER THAT EXISTING.

[555]
CRITERIA FOR EVALUATION OF OCEAN DISPOSAL PERMITS (40CFR PART 227).

[560]
EVALUATION CRITERIA: ENVIRONMENTAL IMPACT

[565]
(40CFR 227.4) EPA WILL DETERMINE IF THERE IS:
1. NO UNACCEPTABLE ADVERSE EFFECTS ON HUMAN HEALTH OR SIGNIFICANT DAMAGE TO MARINE ENVIRONMENT RESOURCES.
2. NO UNACCEPTABLE ADVERSE EFFECT ON MARINE ECOSYSTEM.
3. NO UNACCEPTABLE ADVERSE PERSISTANT/PERMANENT EFFECTS BECAUSE OF PARTICULAR VOLUMES/CONCENTRATIONS DUMPED.
4. NO UNACCEPTABLE ADVERSE EFFECT ON OTHER USES OF THE OCEAN.

[570]
EPA WILL NOT APPROVE UNDER ANY CIRCUMSTANCES MATERIALS INSUFFICIENTLY DESCRIBED BY APPLICANT IN TERMS OF COMPOSITIONS OR PROPERTIES.

[575]
THE FOLLOWING COMPOUNDS ARE PROHIBITED OTHER THAN TRACE CONTAMINANTS IN MATERIALS OTHERWISE SUITABLE FOR OCEAN DISPOSAL (40CFR 227.6):
1. ORGANOHALOGENS.
2. MERCURY/MERCURY COMPOUNDS.
3. CADMIUM/CADMIUM COMPOUNDS.
4. OIL OF ANY KIND IN ANY FORM.
5. KNOWN/SUSPECTED CARCINOGENS.

[580]
MATERIALS CONTAINING FOLLOWING CONSTITUENTS MUST MEET ADDITIONAL LIMITATIONS IN 40CFR 227.7:
1. LIQUID WASTE CONSTITUENTS IMMISCIBLE WITH OR SLIGHTLY SOLUBLE IN WATER.
2. RADIOACTIVE MATERIALS OTHER THAN PROHIBITED IN 40CFR 227.5.
3. WASTES CONTAINING LIVE ORGANISMS.
4. HIGHLY ALKALINE/ACIDIC WASTE.
5. BIODEGRADABLE WASTES WHICH CONSUME OXYGEN.

[585]
LIMITING PERMISSIBLE CONCENTRATION CAN NOT BE EXCEEDED. LIMITING PERMISSIBLE CONCENTRATION IS DEFINED IN 40CFR 227.27.

[590]
QUANTITIES OF MATERIALS DUMPED SHOULD BE LIMITED TO PREVENT LONG TERM DAMAGE TO THE ENVIRONMENT. (40CFR 227.9)

[595]
WASTES AND SITES SHOULD NOT INTERFERE WITH NAVIGATION AND FISHING (40CFR 227.10).

[640]
SITE SELECTION (40CFR 228.5)

[645]
GENERAL CRITERIA FOR SITE SELECTION (40CFR 228.5):
1. MINIMIZE INTERFERENCE OF DISPOSAL ACTIVITIES WITH OTHER ACTIVITIES IN MARINE ENVIRONMENT.
2. TEMPORARY PERTURBATIONS IN WATER QUALITY REDUCED TO AMBIENT BEFORE REACHING BEACH, SHORELINE, MARINE SANCTUARY, OR FISHERY/SHELLFISHERY.
3. SIZE OF DISPOSAL SITE LIMITED TO PERMIT EFFECTIVE MONITORING AND SURVEILLANCE.
4. WHENEVER FEASIBLE, EPA WILL DESIGNATE SITES BEYOND THE CONTINENTAL SHELF.

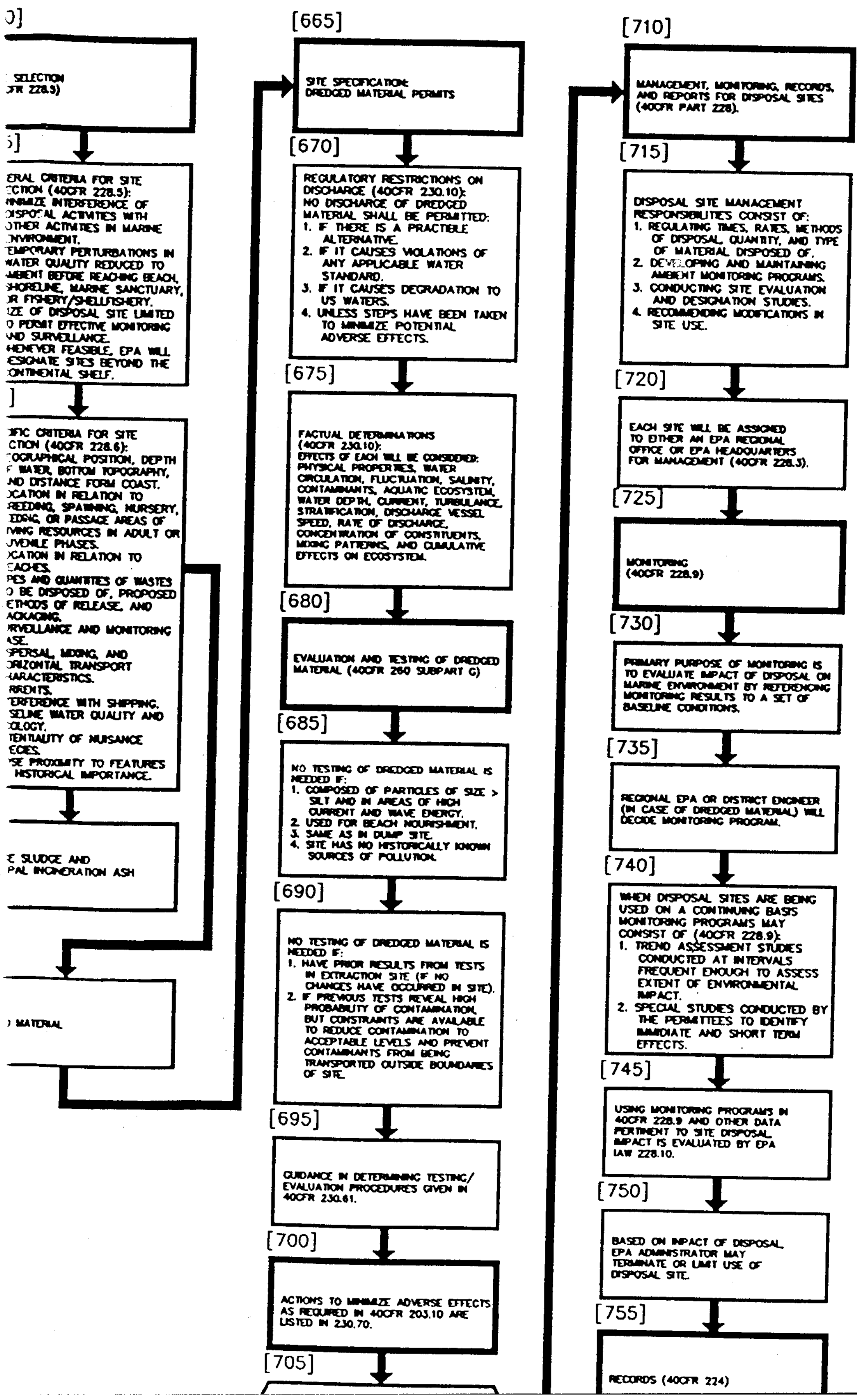
[650]
SPECIFIC CRITERIA FOR SITE SELECTION (40CFR 228.6):
1. GEOGRAPHICAL POSITION, DEPTH OF WATER, BOTTOM TOPOGRAPHY, AND DISTANCE FORM COAST.
2. LOCATION IN RELATION TO BREEDING, SPAWNING, NURSERY, FEEDING, OR PASSAGE AREAS OF LIVING RESOURCES IN ADULT OR JUVENILE PHASES.
3. LOCATION IN RELATION TO BEACHES.
4. TYPES AND QUANTITES OF WASTES TO BE DISPOSED OF, PROPOSED METHODS OF RELEASE, AND PACKAGING.
5. SURVEILLANCE AND MONITORING EASE.
6. DISPERSAL, MIXING, AND HORIZONTAL TRANSPORT CHARACTERISTICS.
7. CURRENTS.
8. INTERFERENCE WITH SHIPPING.
9. BASELINE WATER QUALITY AND ECOLOGY.
10. POTENTIALITY OF NUISANCE SPECIES.
11. CLOSE PROXIMITY TO FEATURES OF HISTORICAL IMPORTANCE.

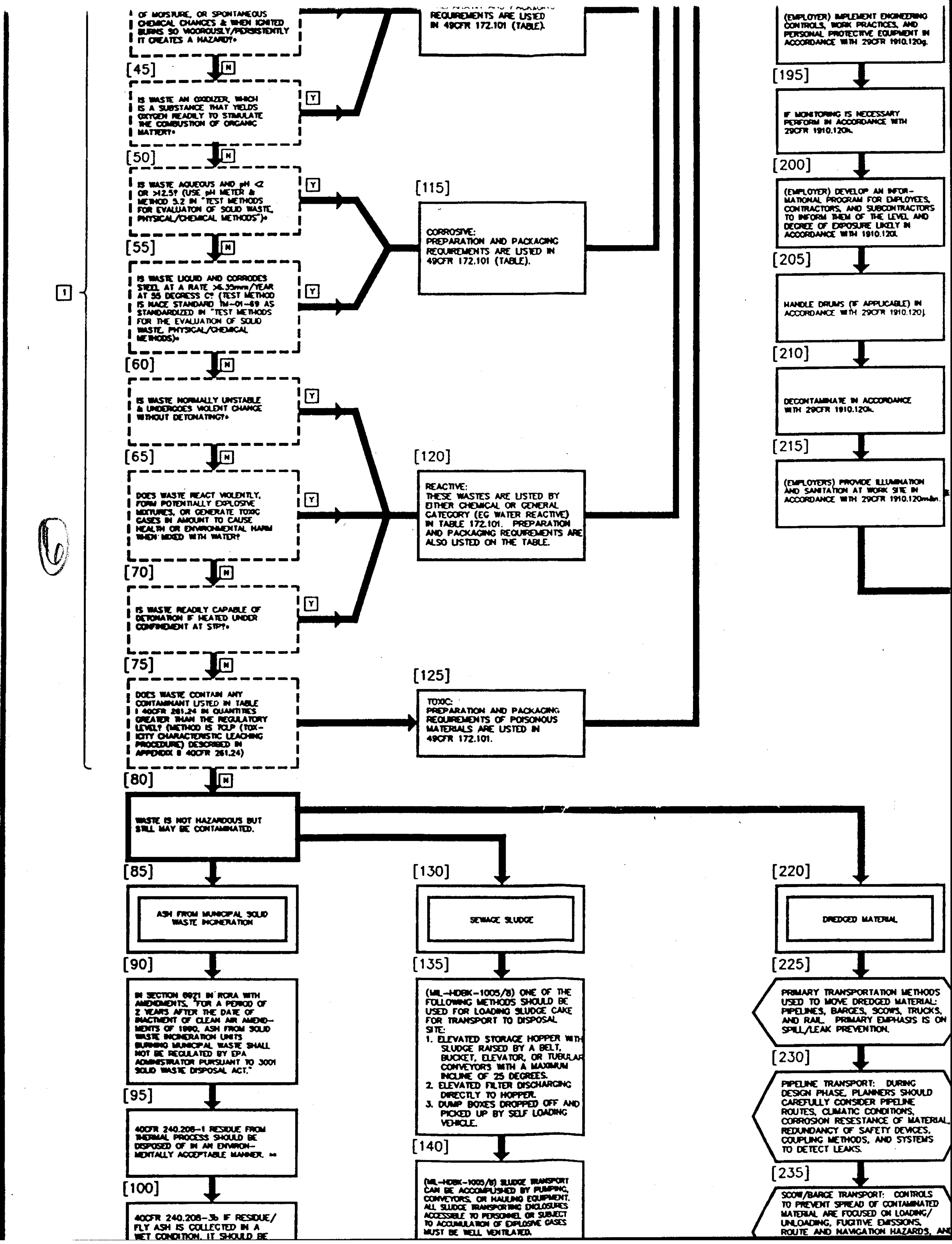
[655]
SEWAGE SLUDGE AND MUNICIPAL INCINERATION ASH

[660]
DREDGED MATERIAL

ZONE	REV	DESCRIPTION	DATE	APPROVED

5




OF MOISTURE, OR SPONTANEOUS CHEMICAL CHANGES & WHEN IGNITED BURNS SO VIGOROUSLY/PERSISTENTLY IT CREATES A HAZARD?*
REQUIREMENTS ARE LISTED IN 49CFR 172.101 (TABLE).
(EMPLOYER) IMPLEMENT ENGINEERING CONTROLS, WORK PRACTICES, AND PERSONAL PROTECTIVE EQUIPMENT IN ACCORDANCE WITH 29CFR 1910.120g.
[45]
N
IS WASTE AN OXIDIZER, WHICH IS A SUBSTANCE THAT YIELDS OXYGEN READILY TO STIMULATE THE COMBUSTION OF ORGANIC MATTER?*
Y
[195]
IF MONITORING IS NECESSARY PERFORM IN ACCORDANCE WITH 29CFR 1910.120h.
[50]
N
IS WASTE AQUEOUS AND pH <2 OR >12.5? (USE pH METER & METHOD 5.2 IN "TEST METHODS FOR EVALUATON OF SOLID WASTE, PHYSICAL/CHEMICAL METHODS")*
Y
[115]
CORROSIVE:
PREPARATION AND PACKAGING REQUIREMENTS ARE LISTED IN 49CFR 172.101 (TABLE).
[200]
(EMPLOYER) DEVELOP AN INFORMATIONAL PROGRAM FOR EMPLOYEES, CONTRACTORS, AND SUBCONTRACTORS TO INFORM THEM OF THE LEVEL AND DEGREE OF EXPOSURE LIKELY IN ACCORDANCE WITH 1910.120l.
[55]
N
IS WASTE LIQUID AND CORRODES STEEL AT A RATE >6.35mm/YEAR AT 55 DEGRESS C? (TEST METHOD IS NACE STANDARD TM-01-69 AS STANDARDIZED IN "TEST METHODS FOR THE EVALUATION OF SOLID WASTE, PHYSICAL/CHEMICAL METHODS)*
Y
[205]
HANDLE DRUMS (IF APPLICABLE) IN ACCORDANCE WITH 29CFR 1910.120j.
1
[60]
N
IS WASTE NORMALLY UNSTABLE & UNDERGOES VIOLENT CHANGE WITHOUT DETONATING?*
Y
[210]
DECONTAMINATE IN ACCORDANCE WITH 29CFR 1910.120k.
[65]
N
[120]
[215]
DOES WASTE REACT VIOLENTLY, FORM POTENTIALLY EXPLOSIVE MIXTURES, OR GENERATE TOXIC GASES IN AMOUNT TO CAUSE HEALTH OR ENVIRONMENTAL HARM WHEN MIXED WITH WATER?
Y
REACTIVE:
THESE WASTES ARE LISTED BY EITHER CHEMICAL OR GENERAL CATEGORY (EG WATER REACTIVE) IN TABLE 172.101. PREPARATION AND PACKAGING REQUIREMENTS ARE ALSO LISTED ON THE TABLE.
(EMPLOYERS) PROVIDE ILLUMINATION AND SANITATION AT WORK SITE IN ACCORDANCE WITH 29CFR 1910.120m&n.
[70]
N
IS WASTE READILY CAPABLE OF DETONATION IF HEATED UNDER CONFINEMENT AT STP?*
Y
[75]
N
[125]
DOES WASTE CONTAIN ANY CONTAMINANT LISTED IN TABLE I 40CFR 261.24 IN QUANTITIES GREATER THAN THE REGULATORY LEVEL? (METHOD IS TCLP (TOXICITY CHARACTERISTIC LEACHING PROCEDURE) DESCRIBED IN APPENDIX II 40CFR 261.24)
TOXIC:
PREPARATION AND PACKAGING REQUIREMENTS OF POISONOUS MATERIALS ARE LISTED IN 49CFR 172.101.
[80]
N
WASTE IS NOT HAZARDOUS BUT STILL MAY BE CONTAMINATED.
[85]
[130]
[220]
ASH FROM MUNICIPAL SOLID WASTE INCINERATION
SEWAGE SLUDGE
DREDGED MATERIAL
[90]
[135]
[225]
IN SECTION 6921 IN RCRA WITH AMENDMENTS, "FOR A PERIOD OF 2 YEARS AFTER THE DATE OF ENACTMENT OF CLEAN AIR AMENDMENTS OF 1990, ASH FROM SOLID WASTE INCINERATION UNITS BURNING MUNICIPAL WASTE SHALL NOT BE REGULATED BY EPA ADMINISTRATOR PURSUANT TO 3001 SOLID WASTE DISPOSAL ACT."
(MIL-HDBK-1005/8) ONE OF THE FOLLOWING METHODS SHOULD BE USED FOR LOADING SLUDGE CAKE FOR TRANSPORT TO DISPOSAL SITE:
1. ELEVATED STORAGE HOPPER WITH SLUDGE RAISED BY A BELT, BUCKET, ELEVATOR, OR TUBULAR CONVEYORS WITH A MAXIMUM INCLINE OF 25 DEGREES.
2. ELEVATED FILTER DISCHARGING DIRECTLY TO HOPPER.
3. DUMP BOXES DROPPED OFF AND PICKED UP BY SELF LOADING VEHICLE.
PRIMARY TRANSPORTATION METHODS USED TO MOVE DREDGED MATERIAL: PIPELINES, BARGES, SCOWS, TRUCKS, AND RAIL. PRIMARY EMPHASIS IS ON SPILL/LEAK PREVENTION.
[230]
PIPELINE TRANSPORT: DURING DESIGN PHASE, PLANNERS SHOULD CAREFULLY CONSIDER PIPELINE ROUTES, CLIMATIC CONDITIONS, CORROSION RESISTANCE OF MATERIAL, REDUNDANCY OF SAFETY DEVICES, COUPLING METHODS, AND SYSTEMS TO DETECT LEAKS.
[95]
40CFR 240.208-1 RESIDUE FROM THERMAL PROCESS SHOULD BE DISPOSED OF IN AN ENVIRONMENTALLY ACCEPTABLE MANNER. **
[140]
[235]
[100]
(MIL-HDBK-1005/8) SLUDGE TRANSPORT CAN BE ACCOMPLISHED BY PUMPING, CONVEYORS, OR HAULING EQUIPMENT. ALL SLUDGE TRANSPORTING ENCLOSURES ACCESSIBLE TO PERSONNEL OR SUBJECT TO ACCUMULATION OF EXPLOSIVE GASES MUST BE WELL VENTILATED.
SCOW/BARGE TRANSPORT: CONTROLS TO PREVENT SPREAD OF CONTAMINATED MATERIAL ARE FOCUSED ON LOADING/UNLOADING, FUGITIVE EMISSIONS, ROUTE AND NAVIGATION HAZARDS, AND
40CFR 240.208-3b IF RESIDUE/FLY ASH IS COLLECTED IN A WET CONDITION, IT SHOULD BE

(EMPLOYER) IMPLEMENT ENGINEERING CONTROLS, WORK PRACTICES, AND PERSONAL PROTECTIVE EQUIPMENT IN ACCORDANCE WITH 29CFR 1910.120g.

[195]

IF MONITORING IS NECESSARY PERFORM IN ACCORDANCE WITH 29CFR 1910.120h.

[200]

(EMPLOYER) DEVELOP AN INFORMATIONAL PROGRAM FOR EMPLOYEES, CONTRACTORS, AND SUBCONTRACTORS TO INFORM THEM OF THE LEVEL AND DEGREE OF EXPOSURE LIKELY IN ACCORDANCE WITH 1910.120i.

[205]

HANDLE DRUMS (IF APPLICABLE) IN ACCORDANCE WITH 29CFR 1910.120j.

[210]

DECONTAMINATE IN ACCORDANCE WITH 29CFR 1910.120k.

[215]

(EMPLOYERS) PROVIDE ILLUMINATION AND SANITATION AT WORK SITE IN ACCORDANCE WITH 29CFR 1910.120m&n.

REFER TO 49CFR 177.853–177.861 FOR GENERAL/SPECIFIC INFORMATION ON DISABLED VEHICLES/ACCIDENTS.

[220]

DREDGED MATERIAL

[225]

PRIMARY TRANSPORTATION METHODS USED TO MOVE DREDGED MATERIAL: PIPELINES, BARGES, SCOWS, TRUCKS, AND RAIL. PRIMARY EMPHASIS IS ON SPILL/LEAK PREVENTION.

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SCOW/BARGE TRANSPORT: CONTROLS TO PREVENT SPREAD OF CONTAMINATED MATERIAL ARE FOCUSED ON LOADING/UNLOADING, FUGITIVE EMISSIONS, ROUTE AND NAVIGATION HAZARDS, AND

2

STOW HAZARDOUS MATERIALS IN A MANNER THAT WILL FACILITATE INSPECTION AND REMOVAL FROM DANGER AND FIRE; MARK PACKAGES "THIS END UP" (GENERAL STOWAGE REQUIREMENTS 49CFR 176 SUBPART C.

[340]

IF VESSEL IS DESIGNED FOR CARRYING MATERIALS IN FREIGHT CONTAINERS OR IN BARGES AND IS EQUIPPED WITH FIXED FIRE EXTINGUISHERS, HAZARDOUS MATERIALS NEED NOT BE STOWED IN THE MANNER STATED IN THE PREVIOUS BOX. FOLLOW GENERAL STOWAGE REQUIREMENTS IN 49CFR 176 SUBPART C.

[345]

REFER TO 49CFR 176.83 FOR INFORMATION FOR SEGREGATION/SEPARATION OF HAZARDOUS MATERIALS.

[350]

ADHERE TO SPECIAL REQUIREMENTS FOR BARGES IN 49CFR 176.95 IF APPLICABLE.

[355]

LOAD AND STOW HAZARDOUS MATERIALS IN ACCORDANCE WITH SPECIFIC REQUIREMENTS IN 49CFR 176 SUBPARTS C–O.

[400]

SPECIAL PERMISSION FROM THE US COAST GUARD COMMANDANT IS NEEDED TO TRANSPORT IN BULK LIQUID WASTE NOT LISTED IN 46CFR 151.05.

[405]

COMMANDANT MAY APPROVE VESSELS OF NOVEL DESIGN BOTH NEW AND FOR CONVERSION IF IT IS SHOWN THAT VESSEL IS SAFE AND MEETS STANDARDS IN 46CFR PART 151.

[410]

CERTIFICATION AND INSPECTION OF UNMANNED BARGES CARRYING LIQUID HAZARDOUS MATERIALS IN ACCORDANCE WITH 46CFR 151.04.

[415]

MINIMUM REQUIREMENTS FOR TRANSPORT OF LIQUIDS IN BULK IN UNMANNED BARGES ARE LOCATED IN TABLE 151.05.

[420]

REQUIREMENTS FOR CARGO SEPARATION FOR CARGO TANKS, CARGO PIPING, AND CARGO VENTS ARE LISTED IN 46CFR 151.13.

[425]

46CFR 151.15 LISTS VARIOUS TANK TYPES, CONSTRUCTION, VENTING, VENT PIPING, AND GAUGE DEVICES FOR CARGO CONTAINMENT OF BULK LIQUID HAZARDOUS MATERIALS.

[430]

CARGO TRANSFER INCLUDING PIPING, VALVING, INSTRUMENTATION, HOSING DONE IN ACCORDANCE WITH 46CFR 151.20.

[435]

ENVIRONMENTAL CONTROL IN THE FORM OF CARGO PROTECTION REQUIRED IS IN 46CFR 151.25

[440]

PORTABLE FIRE EXTINGUISHERS IF REQUIRED IN 46CFR 151.05 SHALL BE INSTALLED IN ACCORDANCE WITH 46CFR 151.30

[445]

REQUIREMENTS FOR OPERATIONS OF BARGES CERTIFIED AS TANK BARGES ARE LISTED IN 46CFR 151.45

[450]

SPECIAL REQUIREMENTS FOR CERTAIN BULK HAZARDOUS LIQUID CARGOES ARE IN 46CFR 151.50.

[400]

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ON ANNEX I AND RESTRICTS DUMPING OF MATERIALS ON ANNEX ACCORDING TO LONDON DUMPING CONVENTION. ALL OTHER MATERIALS MAY BE DUMPED AFTER THE ISSUE OF A GENERAL PERMIT; HOWEVER, THE COVER LETTER ATTACHED TO THE LONDON DUMPING CONVENTION STATES THAT ABYSSAL OCEANS HAVE NO SPECIAL REQUIREMENTS REGARDING THE LONDON DUMPING CONVENTION. THIS PROJECT IS SUBJECT TO REGULATIONS OF EPA.

[490]

58FR 9248 (STANDARDS FOR THE USE AND DISPOSAL OF SEWAGE SLUDGE) STATES THAT NO EPA STANDARDS ARE ESTABLISHED FOR THE OCEAN DISPOSAL OF SEWAGE SLUDGE. THIS IS REGULATED BY MPRSA (1988 OCEAN DUMPING BAN AMENDMENT).

PROCESSING FEES: $1,000.00 FOR EXISTING SITE PLU $3,000.00 ADDITIONAL TO DUMP I SITE OTHER THAT EXISTING.

REFERENCES:

29CFR Part 1910. Labor. Department of Labor. Published by Office of the Federal Register. July 1, 1992.

40CFR Parts 190–259. Protection of the Environment. Environmental Protection Agency. Published by Office of the Federal Register. July 1, 1993.

40CFR Parts 260–299. Protection of the Environment. Environmental Protection Agency. Published by Offece of the Federal Register. July 1, 1992.

46CFR Parts 140–155. Shipping. Department of Transportation, Coast Guard. Published by Office of the Federal Register. October 1, 1993.

49CFR Parts 100–177. Transportation. Department of Transportation. Published by Office of the Federal Register. October 1, 1993.

58FR 9248. Standards for the Use or Disposal of Sewage Sludge. Environmental Protection Agency. Federal Register Vol. 58, No. 32. February 19, 1993.

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Zarba, Christopher. National Perspective on Sediment Quality. Published in Contaminated Marine Sediments--Assessment and Remediation. National Academy Press Washington, DC. 1989.

LEGEND:

START; FINISH

CODE OF FEDERAL REGULATIONS REFERENCE DESCRIPTION

SUPPORTING REGULATORY CRITERIA

DECISION BLOCK: YES; NO

SPECIAL ARMY CORP OF ENGINEERS REGULATORY CRITERIA

TOP LEVEL REGULATORY CRITERIA

N00014-94-6009 TASK 2 TOP LEVEL ENGINEERING ANALYSIS

8

PROCESSING FEES:
$1,000.00 FOR EXISTING SITE PLUS
$3,000.00 ADDITIONAL TO DUMP IN
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LIMITING PERMISSIBLE CONCENTRATION CAN NOT BE EXCEEDED. LIMITING PERMISSIBLE CONCENTRATION IS DEFINED IN 40CFR 227.27.

[590]

QUANTITIES OF MATERIALS DUMPED SHOULD BE LIMITED TO PREVENT LONG TERM DAMAGE TO THE ENVIRONMENT. (40CFR 227.9)

[595]

WASTES AND SITES SHOULD NOT INTERFERE WITH NAVIGATION AND FISHING (40CFR 227.10).

[600]

WASTES CONTAINERIZED SOLELY FOR PURPOSE OF TRANSPORT TO DUMP SITE AND EXPECTED TO RUPTURE/LEAK ON IMPACT MUST MEET REQUIREMENTS IN 227.6-227.10.

[605]

REQUIREMENTS FOR OTHER CONTAINERIZED WASTE (40CFR 227.11):
1. MATERIALS DECAY/DECOMPOSE TO INNOCUOUS FORMS WITHIN LIFE EXPECTANCY OF CONTAINERS.
2. ONLY SHORT TERM LOCAL EFFECTS WILL OCCUR SHOULD CONTENTS RUPTURE AT ANY TIME.
3. CONTAINERS PLACED AT DEPTHS & LOCATIONS WHERE THEY WILL CAUSE NO THREAT TO NAVIGATION, FISHING, SHORELINES, & BEACHES.

[610]

(40CFR 227.12) IF WASTE CONTAINS INERT NATURAL MINERALS OR MATERIALS COMPATIBLE WITH OCEAN ENVIRONMENT, ITS GENERALLY APPROVED IF IT IS INSOLUBLE ABOVE APPLICABLE TRACE LIMITING CONCENTRATIONS, SETTLEABLE, AND HAS PARTICLE SIZE AND DENSITY SO THAT WOULD BE DEPOSITED/DISPERSED WITHOUT DAMAGE. PERSISTANT SYNTHETICS WILL NOT BE APPROVED UNLESS CAN BE PROCESSED SO THEY WILL SINK AND REMAIN IN PLACE.

[615]

EVALUATION CRITERIA:
NEED FOR OCEAN DUMPING

[620]

NEED FOR DUMPING WILL BE DETERMINED BY THE FOLLOWING (40CFR 227.15):
1. DEGREE OF TREATMENT NEEDED FOR WASTE TO BE DUMPED.
2. IF LESS WASTE COULD BE GENERATED BY MODIFYING MATERIALS/MANUFACTURING.
3. RISKS, IMPACT, AND COST FOR OCEAN DUMPING AS OPPOSED TO OTHER FEASIBLE ALTERNATIVES.

[625]

BASED UPON EVALUATION IN PREVIOUS BOX, EPA ADMINISTRATOR WILL CONSIDER (40CFR 227.16):

1. IF ANY IMPROVEMENTS CAN BE MADE IN PROCESS, TECHNOLOGY, WASTE TREATMENT, LOCATION, METHOD OF DISPOSAL (ADMINISTRATOR CONSIDERS COST OF IMPROVEMENT VS ENVIRONMENTAL IMPACT.
2. DURATION OF PERMIT.

[630]

EVALUATION CRITERIA:
IMPACT ON ESTHETIC, RECREATIONAL, AND ECONOMICS. REFER TO 40CFR 227.17 FOR CRITERIA.

[635]

EVALATION CRITERIA:
IMPACT OF THE PROPOSED DUMPING ON OTHER USES OF THE OCEAN. APPRAISAL MADE ON THE FOLLOWING:
1. COMMERCIAL FISHING IN OPEN OCEAN AREAS.
2. RECREATIONAL FISHING IN OPEN

CONTAMINANTS FROM BEING TRANSPORTED OUTSIDE BOUND OF SITE.

[695]

GUIDANCE IN DETERMINING TESTING EVALUATION PROCEDURES GIVEN I 40CFR 230.61.

[700]

ACTIONS TO MINIMIZE ADVERSE EF AS REQUIRED IN 40CFR 203.10 A LISTED IN 230.70.

[705]

EPA'S THRESHOLD CONCENTRATION CONTAMINANTS FOUND IN DREDGE SEDIMENTS (DETERMINES CONTAM VS NONCONTAMINATED) ARE LISTE TABLE 1 IN NATIONAL PERSPECTIV SEDIMENT QUALITY BY CHRISTOPHE ZARBA.

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CONTRACT NO.
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ACCEPTABLE LEVELS AND PREVENT CONTAMINANTS FROM BEING TRANSPORTED OUTSIDE BOUNDARIES OF SITE.

[695]

GUIDANCE IN DETERMINING TESTING/ EVALUATION PROCEDURES GIVEN IN 40CFR 230.61.

[700]

ACTIONS TO MINIMIZE ADVERSE EFFECTS AS REQUIRED IN 40CFR 203.10 ARE LISTED IN 230.70.

[705]

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[745]

USING MONITORING PROGRAMS IN 40CFR 228.9 AND OTHER DATA PERTINENT TO SITE DISPOSAL, IMPACT IS EVALUATED BY EPA IAW 228.10.

[750]

BASED ON IMPACT OF DISPOSAL, EPA ADMINISTRATOR MAY TERMINATE OR LIMIT USE OF DISPOSAL SITE.

[755]

RECORDS (40CFR 224)

[760]

EACH PERMITTEE SHALL MAINTAIN COMPLETE RECORDS OF THE FOLLOWING INFORMATION (40CFR 224.1)

1. PHYSICAL/CHEMICAL CHARACTERISTICS OF MATERIAL BEING DUMPED.
2. PRECISE TIMES/LOCATIONS OF DUMPING.
3. ANY OTHER INFORMATION REQUIRED AS A CONDITION OF PERMIT.

[765]

THIS INFORMATION IS TO BE AVAILABLE FOR INSPECTION BY EPA ADMINISTRATOR, COMMANDANT OF COAST GUARD OR THEIR REPRESENTATIVES.

[770]

REPORTS (40CFR 224)

[775]

INFORMATION KEPT IN RECORDS (40CFR 224.1) SHALL BE REPORTED TO EPA ADMINISTRATOR WITHIN 30 DAYS OF THE FOLLOWING (40CFR 224.2):

1. EACH 6 MONTH PERIOD FOLLOWING EFFECTIVE DATE OF PERMIT.
2. EXPIRATION OF PERMIT.

[780]

REPORTS OF EMERGENCY DUMPING ARE FILED IN ACCORDANCE WITH 40CFR 224.2b.

[785]

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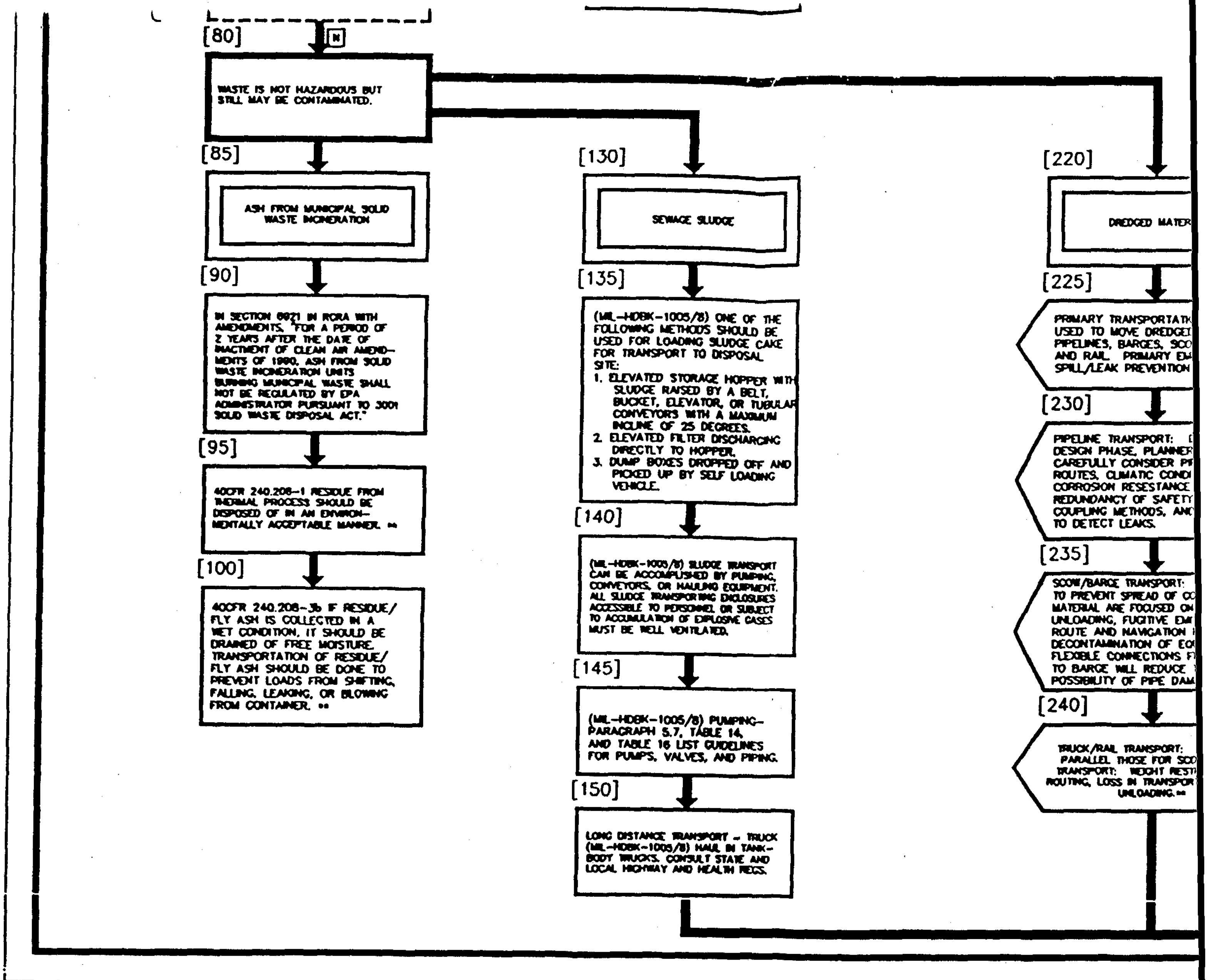
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N
WASTE IS NOT HAZARDOUS BUT STILL MAY BE CONTAMINATED.
[85]
ASH FROM MUNICIPAL SOLID WASTE INCINERATION
[90]
IN SECTION 6921 IN RCRA WITH AMENDMENTS, "FOR A PERIOD OF 2 YEARS AFTER THE DATE OF INACTMENT OF CLEAN AIR AMENDMENTS OF 1990, ASH FROM SOLID WASTE INCINERATION UNITS BURNING MUNICIPAL WASTE SHALL NOT BE REGULATED BY EPA ADMINISTRATOR PURSUANT TO 3001 SOLID WASTE DISPOSAL ACT."
[95]
40CFR 240.208-1 RESIDUE FROM THERMAL PROCESS SHOULD BE DISPOSED OF IN AN ENVIRONMENTALLY ACCEPTABLE MANNER. **
[100]
40CFR 240.208-3b IF RESIDUE/FLY ASH IS COLLECTED IN A WET CONDITION, IT SHOULD BE DRAINED OF FREE MOISTURE. TRANSPORTATION OF RESIDUE/FLY ASH SHOULD BE DONE TO PREVENT LOADS FROM SHIFTING, FALLING, LEAKING, OR BLOWING FROM CONTAINER. **
[130]
SEWAGE SLUDGE
[135]
(MIL-HDBK-1005/8) ONE OF THE FOLLOWING METHODS SHOULD BE USED FOR LOADING SLUDGE CAKE FOR TRANSPORT TO DISPOSAL SITE:
1. ELEVATED STORAGE HOPPER WITH SLUDGE RAISED BY A BELT, BUCKET, ELEVATOR, OR TUBULAR CONVEYORS WITH A MAXIMUM INCLINE OF 25 DEGREES.
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3. DUMP BOXES DROPPED OFF AND PICKED UP BY SELF LOADING VEHICLE.
[140]
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[145]
(MIL-HDBK-1005/8) PUMPING-PARAGRAPH 5.7, TABLE 14, AND TABLE 16 LIST GUIDELINES FOR PUMPS, VALVES, AND PIPING.
[150]
LONG DISTANCE TRANSPORT - TRUCK (MIL-HDBK-1005/8) HAUL IN TANK-BODY TRUCKS. CONSULT STATE AND LOCAL HIGHWAY AND HEALTH REGS.
[220]
DREDGED MATER
[225]
PRIMARY TRANSPORTAT USED TO MOVE DREDGE PIPELINES, BARGES, SCO AND RAIL. PRIMARY E SPILL/LEAK PREVENTION
[230]
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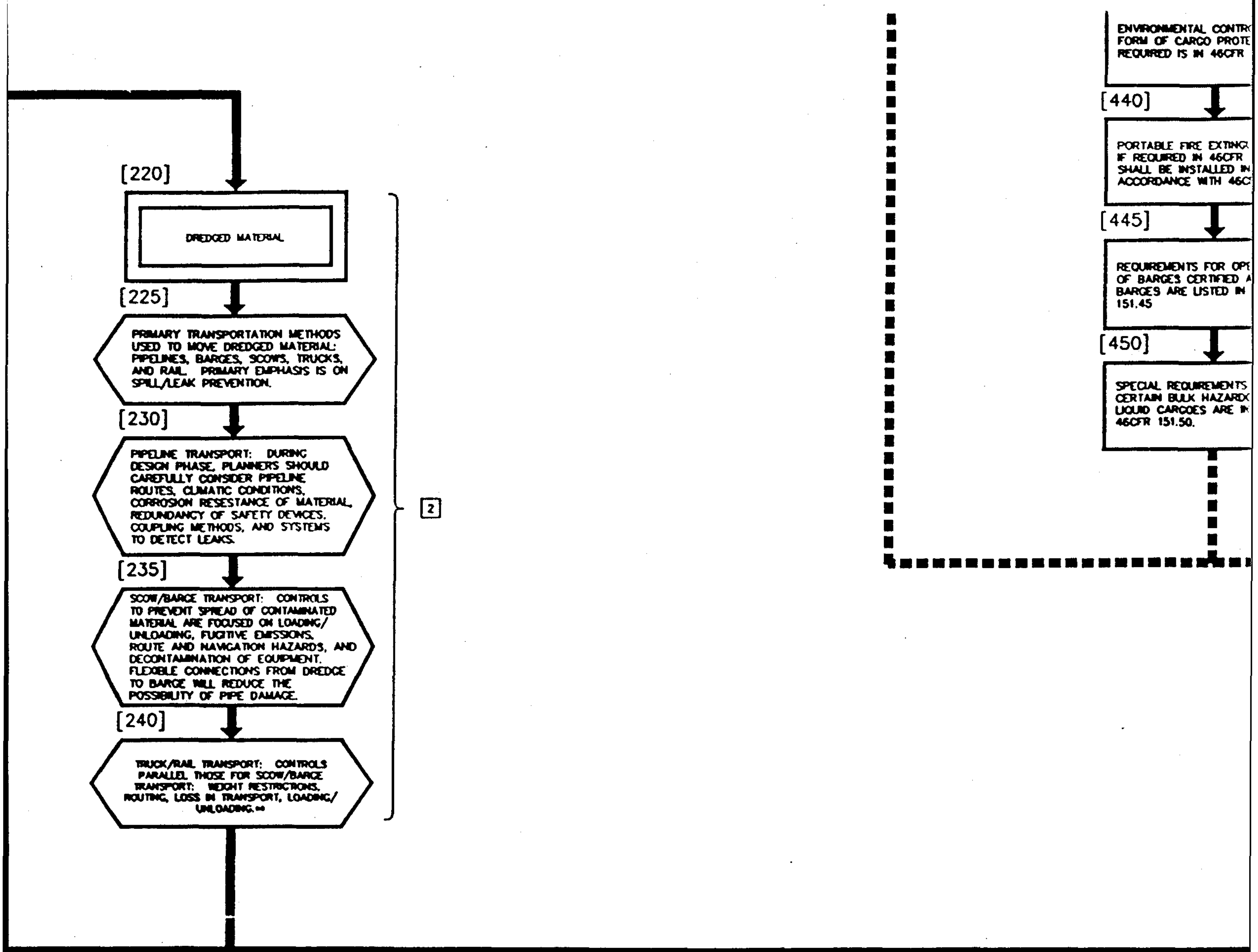
[235]
SCOW/BARGE TRANSPORT: TO PREVENT SPREAD OF C MATERIAL ARE FOCUSED ON UNLOADING, FUGITIVE EM ROUTE AND NAVIGATION DECONTAMINATION OF EO FLEXIBLE CONNECTIONS F TO BARGE WILL REDUCE POSSIBILITY OF PIPE DAM
[240]
TRUCK/RAIL TRANSPORT: PARALLEL THOSE FOR SCO TRANSPORT: WEIGHT REST ROUTING, LOSS IN TRANSPOR UNLOADING. **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[240]
TRUCK/RAIL TRANSPORT: CONTROLS PARALLEL THOSE FOR SCOW/BARGE TRANSPORT: WEIGHT RESTRICTIONS, ROUTING, LOSS IN TRANSPORT, LOADING/UNLOADING.
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ENVIRONMENTAL CONTR
FORM OF CARGO PROTE
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REQUIREMENTS FOR OP
OF BARGES CERTIFIED
BARGES ARE LISTED IN
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SPECIAL REQUIREMENTS
CERTAIN BULK HAZARD
LIQUID CARGOES ARE IN
46CFR 151.50.

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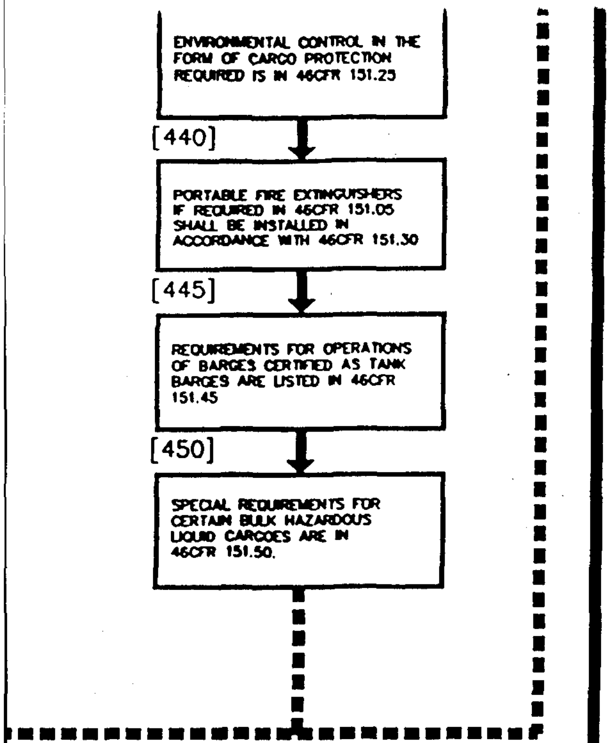

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LEGEND:

START; FINISH

CODE OF FEDERAL REGULATIONS REFERENCE DESCRIPTION

SUPPORTING REGULATORY CRITERIA

DECISION BLOCK: YES; NO

SPECIAL ARMY CORP OF ENGINEERS REGULATORY CRITERIA

TOP LEVEL REGULATORY CRITERIA

N00014-94-6009 TASK 2 TOP LEVEL ENGINEERING ANALYSIS OBJECTIVES

NOTES:

1 WASTE IS CONSIDERED TO BE HAZARDOUS IF IT EXHIBITS ANY OF THESE GENERAL CHARACTERISTICS

2 "ALTERNATIVES FOR CONTROL TREATMENT OF CONTAMINATED DREDGED MATERIAL" US ARMY ENGINEER WATERWAYS EXPERIMENTAL STATION

ett, Richard A.
R. Bradbury, and
Control/Treatment
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Press Washington, DC.

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Sanctuaries Act of 1972.
'2. Chapter 27.

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National Academy Press

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[620]

NEED FOR DUMPING WILL BE DETERMINED BY THE FOLLOWING (40CFR 227.15):
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2. IF LESS WASTE COULD BE GENERATED BY MODIFYING MATERIALS/MANUFACTURING.
3. RISKS, IMPACT, AND COST FOR OCEAN DUMPING AS OPPOSED TO OTHER FEASIBLE ALTERNATIVES.

[625]

BASED UPON EVALUATION IN PREVIOUS BOX, EPA ADMINISTRATOR WILL CONSIDER (40CFR 227.16):
1. IF ANY IMPROVEMENTS CAN BE MADE IN PROCESS, TECHNOLOGY, WASTE TREATMENT, LOCATION, METHOD OF DISPOSAL (ADMINISTRATOR CONSIDERS COST OF IMPROVEMENT VS ENVIRONMENTAL IMPACT.
2. DURATION OF PERMIT.

[630]

EVALUATION CRITERIA:
IMPACT ON ESTHETIC, RECREATIONAL, AND ECONOMICS. REFER TO 40CFR 227.17 FOR CRITERIA.

[635]

EVALATION CRITERIA:
IMPACT OF THE PROPOSED DUMPING ON OTHER USES OF THE OCEAN. APPRAISAL MADE ON THE FOLLOWING:
1. COMMERCIAL FISHING IN OPEN OCEAN AREAS.
2. RECREATIONAL FISHING IN OPEN OCEAN AREAS.
3. COMMERCIAL NAVIGATION.
4. RECREATIONAL NAVIGATION.
5. ACTUAL/ANTICIPATED EXPLOITATION OF LIVING/NONLIVING MARINE RESOURCES.

CONTRACT NO.

N00014-94-C-6009

APPROVALS		DATE
DRAWN	C. GAVIN	
CHECKED	A. MARCY	
ENGR	A. MARCY	
APPROVED	D. CRAIG	
APPROVED	M. HIGHTOWER	

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REPORTS OF EMERGENCY DUMPING ARE FILED IN ACCORDANCE WITH 40CFR 224.2b.

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FINISH

NO. 014-94-C-6009	OCEANEERING TECHNOLOGIES	OCEANEERING TECHNOLOGIES INC. 501 PRINCE GEORGES BLVD. UPPER MARLBORO, MD 20772

PROVALS	DATE
C. GAVIN	
A. MARCY	
A. MARCY	
D. CRAIG	
. HIGHTOWER	

TITLE

REGULATORY FLOW DIAGRAM FOR WASTE STREAM PRODUCTS

SIZE	CAGE CODE	DWG. NO.	REV.
D	63402	DM-103175	—

SCALE	CALC WT	ACT WT	SHEET
N/A	—	—	1 OF 1